

HELMINTHOLOGICAL ABSTRACTS

A quarterly review of world literature on helminths and their vectors especially in relation to veterinary, medical and plant pathology, soil science, fisheries, fresh-water and marine zoology, taxonomy and geographical distribution.



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LIST OF CONTENTS

v

	PAGE
Review Article	355
Book Reviews	370
Film Reviews	372
Summary of Reports	373

ABSTRACTS

MEDICAL HELMINTHOLOGY	PAGE	*Nematoda parasitic in other	
Surveys . . . Nos. 1580-1591	376	invertebrates . . . nil	434
Trematoda . . . Nos. 1592-1613	378	Control . . . Nos. 1925-1954	434
Cestoda . . . Nos. 1614-1643	382	Miscellaneous . . Nos. 1955-1956	439
Acanthocephala . . . nil		TAXONOMY	
Nematoda . . . Nos. 1644-1700	385	Monogenea . . . No. 1957	440
Nematomorpha . . . nil		*Aspidobothria . . . nil	440
Hirudinea . . . No. 1701	395	Digenea . . . Nos. 1958-1974	440
Pentastomida . . . No. 1702	395	Cestodaria . . . nil	
Miscellaneous . . . Nos. 1703-1713	395	Cestoda . . . Nos. 1975-1979	445
VETERINARY HELMINTHOLOGY		Acanthocephala . . No. 1980	446
Horses, Donkeys		Nematoda . . . Nos. 1981-2015	446
and Mules . . . Nos. 1714-1715	397	Nematomorpha . . . nil	
Cattle . . . Nos. 1716-1736	397	*Hirudinea . . . nil	454
Sheep and Goats . . Nos. 1737-1763	401	Pentastomida . . . nil	
Pigs (Swine) . . . Nos. 1764-1775	405	Miscellaneous . . . nil	
Elephants . . . nil		INVERTEBRATE INTERMEDIATE HOSTS	
Camels and Llamas . Nos. 1776-1778	407	Arthropoda . . . Nos. 2016-2024	455
*Rabbits and Hares . . nil	407	Mollusca . . . Nos. 2025-2028	457
Cats and Dogs . . . Nos. 1779-1788	408	Control . . . Nos. 2029-2034	457
Fur-bearing		*Miscellaneous . . . nil	459
Animals . . . No. 1789	409	GENERAL HELMINTHOLOGY	
Laboratory		Technique . . . Nos. 2035-2069	459
Animals . . . Nos. 1790-1793	409	Geographical	
Poultry . . . Nos. 1794-1802	410	Distribution . . Nos. 2070-2080	466
Other Mammals . . . Nos. 1803-1809	412	Cytology and	
Other Birds . . . Nos. 1810-1813	413	Genetics . . . Nos. 2081-2087	468
Reptiles and		Morphology, Anatomy and	
Amphibia . . . No. 1814	414	Histology . . . Nos. 2088-2114	469
Miscellaneous . . . Nos. 1815-1852	414	Life-cycle and	
FISHERIES HELMINTHOLOGY		Development . . Nos. 2115-2151	475
Fresh-water . . . Nos. 1853-1858	421	Bionomics . . . Nos. 2152-2218	482
Marine . . . Nos. 1859-1862	422	Pathogenesis . . . Nos. 2219-2257	496
Miscellaneous . . . No. 1863	423	Immunity . . . Nos. 2258-2288	504
NEMATOLOGY		Anthelmintics . . Nos. 2289-2313	511
Free-living		Economic aspects . Nos. 2314-2316	516
Nematoda . . . No. 1864	423	History . . . Nos. 2317-2319	517
Plant-parasitic		Biography . . . No. 2320	517
Nematoda . . . Nos. 1865-1923	424	Hyperparasitism . . . nil	
Insect-parasitic		Evolution . . . Nos. 2321-2324	517
Nematoda . . . No. 1924	434	Miscellaneous . . Nos. 2325-2332	518
News and Notes			vii
Reports of Meetings			x
Programmes and Personnel			x

* But see for cross references.

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by Mary T. Franklin, Ph.D. and David J. Hooper
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HELMINTHOLOGICAL ABSTRACTS

Vol. 29, Part 4

REVIEW ARTICLE

Advances in Knowledge on the Distribution and Importance of Hydatid Disease as World Health and Economic Problems during the Decade

1950-1959

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There are eight species of *Echinococcus* which may be valid. Recorded cases in man however, have been attributed only to the first two species described hereunder.

E. granulosus (Batsch, 1786) has a universal distribution. Natural definitive hosts include the dog, wolf, dingo, jackal and coyote. Important intermediate hosts in various countries include a wide range of large herbivores, pig and man.

E. multilocularis Leuckart, 1863 is morphologically distinct both in its tapeworm and cystic phases from *E. granulosus*. It also has a more restricted distribution and a wider range of primary hosts which include dogs, foxes and cats. Several of its natural secondary hosts differ also from those of *E. granulosus*, being species of microtine rodents. Vogel (1957b) succeeded in Europe in infecting a wide variety of hosts including monkeys and pigs, but failed to infect sheep or cattle. In man, *E. multilocularis* is responsible for alveolar hydatid disease.

E. oligarthrus (Diesing, 1863) and *E. felidis* Ortlepp, 1937 parasitize felines (jaguar and lion respectively), but little is known of their life-cycles or significance. *E. lycaontis* Ortlepp, 1934 was described from the cape hunting dog (*Lycaon pictus*) in South Africa, but again little is known of the natural life-cycle. *E. longimanubrius* Cameron, 1926 and *E. minimus* Cameron, 1926 are considered by Rausch (1953) to be species inquirendae. He suggests they may be conspecific with *E. granulosus* as also may be *E. cameroni* Ortlepp, 1934. This last-mentioned was described from a fox in Great Britain. However, as *E. granulosus* does not reach sexual maturity in foxes (Matoff & Jantscheff 1954, Drežančić & Wikerhauser 1956, Bronzino *et al.* 1958, Mazzotti 1958, Gemmell 1959a) it may well be that on further investigation this last-mentioned species may prove to be valid.

E. granulosus

EPIDEMIOLOGICAL CONSIDERATIONS

E. granulosus may propagate in a simple domestic cycle involving domestic dogs and a wide variety of food animals or in a sylvatic cycle involving wild animals. Both types of cycle may be linked as a compound cycle, when the parasite passes through domestic to wild animals

and vice versa. A satisfactory ecological association between susceptible primary and secondary hosts together with a suitable environment for its free-living stage is a prerequisite for survival of the parasite.

In the field superinfections and reinfections in definitive hosts are common in many countries. The number of tapeworms from a single infection varies within wide limits ranging from a single worm to 30,000 or more specimens. The incidence amongst certain groups of dogs frequently reaches 40%, all of which will not necessarily be heavily infected. Groups of dogs most commonly found with high incidences are those associated with animal industries. In some countries even dogs in urban areas harbour *E. granulosus*.

Unlike tapeworms in the definitive host, cysts may continue to propagate asexually as long as the intermediate host, including man, survives. The proportion of animals affected with cysts increases with age. Hydatid cysts have been recorded in practically all organs of the body but the major sites of election in man and animals are the liver and lungs. Sheep undoubtedly play the major role in a domestic cycle in most countries. Pigs, like sheep, harbour fertile cysts, but usually play a lesser role due perhaps to their younger age at slaughter and the smaller numbers killed on farms. They are often housed and may not be exposed to the same risk of infection as sheep. Where pigs are kept on "free range" high incidences are frequently recorded. Cattle, buffaloes, camels, horses and reindeer play a role as intermediate hosts in a domestic cycle in some countries. Camels are frequently observed with fertile cysts. Cattle on the other hand, although often affected, are not very suitable hosts as a considerable proportion of cysts are sterile. Horses, like cattle, are not usually regarded as satisfactory intermediate hosts, because recorded incidences are usually low, although cysts are often fertile.

In regions where the parasite is commonly found, the visual recorded incidence in intermediate animal hosts varies from 1% to as high as 100%. Where observations on age groups have been made in endemic regions, most writers record differences from 5% to 10% in animals up to two years of age and 60% up to 100% in animals of five or more years. The more intense the cycle, the lower the age (within limits) in which the majority of susceptible animals in the group become infected. Differences in age groups examined, account for much of the variations in the average incidences recorded in the same species of animal within and between highly endemic regions from year to year. The incidence in susceptible animal hosts, however, may be high or low, wide-spread or restricted within the same geographical region. In this comparative review, an average incidence of 20% or more in one or more species of definitive or intermediate host is regarded as high.

GEOGRAPHICAL DISTRIBUTION

EUROPE

Major centres: The major centres with a predominantly wide-spread high incidence are islands and countries bordering the Mediterranean.

Greece: Greece may be regarded as one of the classical homes of hydatid. Maccas (1951 and 1955) suggests that the recorded incidence in man is still increasing. He records 4,417 cases between 1940 and 1949. Between 1950 and 1953 inclusive 2,373 clinical cases were recorded with an annual index of 7.5 to 8.3 clinical cases per 100,000 inhabitants. The parasite is commoner in man and domestic animals in Continental Greece and the Aegean Islands than in Macedonia and Thrace. Recently Papaspyrou (1957) records that 2,477 dogs (24.4%) of 10,146 surveyed carried *E. granulosus*. Even amongst urban dogs the incidence reached 17%. Papachristophilou (1957) confirms the intensity of the cycle, recording an average incidence of 29%, 54%, 2.3% and 3.6% in cattle, sheep, pigs and goats respectively.

Cyprus: According to Marangos (1951) between 50% and 70% of all slaughtered animals are affected with hydatid. He records 650 cases in man between 1936 and 1949 with an index of 12.9 cases per 100,000 inhabitants.

Yugoslavia: Hydatid is particularly common on the Adriatic Littoral. Indeed in some villages about 4% of the inhabitants have hydatid. Incidences in dogs as high as 35.5% are

recorded in Dalmatia (Nevenić, 1953 and Nevenić *et al.*, 1955). Other regional surveys by Boko (1952), Pavlović (1954), Mikačić (1955), Rogošić (1955), Gall & Delić (1957) and Divljanović (1956 & 1957) show that a high incidence is wide-spread. Suić (1957 a & b) estimates that the average incidence is 19.9%, 20.1%, 20.5% and 5% for cattle, sheep, pigs and goats respectively. As with most other European countries of the Mediterranean Littoral he records an increase in incidence in man from an annual average of 141 cases between 1930 and 1947 to 471 cases between 1948 and 1951 to 571 cases between 1952 and 1955 with 654 cases occurring in 1955. The index of recorded clinical cases per 100,000 inhabitants is 3.37 for the whole country of 17 million inhabitants. The highest regional index (27.1) occurs in Dalmatia.

Bulgaria: According to Tomov (1957) 2,222 human cases were recorded in Bulgaria between 1940 and 1950 with an index per 100,000 inhabitants of 2.88. More recently Nenov (1960) records 3,201 cases in the ten-year period 1944 to 1954. As found in Greece and Yugoslavia the parasite is common in sheep (66.5%), cattle (40.8%), pigs (4.4%), rural dogs (40%) and urban dogs (16%).

Italy: Recent regional observations by Biocca & Massi (1952), Giuliani (1953), Pierotti (1954), Corsalini (1955), Airoidi & Belli (1956), Saggese (1955), Panebianco & Sciotteri (1955), Gallo (1955), Vitale (1956) and Puccini & Colella (1956) indicate that hydatid is common. Pellegrini & Cilli (1955) in their review of a survey involving 1,525,206 food animals record that the average incidence for the whole country was 9.2%, 23.9%, 9.7% and 3.5% in cattle, sheep, goats and pigs respectively. The incidence was high in the central regions and islands and medium in the north and south. They also record an incidence of 55.1%, 68.7% and 19.8% in cattle, sheep and pigs respectively in Sardinia. As in Greece and Yugoslavia, registered human cases increased from a yearly average of 270 between 1941 and 1947 to 672 annually between 1948 and 1952 (Pellegrini & Cilli 1955). Nearly one third of these occurred in Sardinia. Giromini & Granati (1954) in their study of 5,048 cases, record 186 cases in 1941 and 799 cases in 1952. The annual index (1.4) per 100,000 inhabitants is lower than that occurring in countries to the east. However, the index in Sardinia (14.2) is similar to that in Cyprus.

France: In addition to Corsica, where up to 60%, 10% and 5% of sheep, cattle and goats respectively and between 2% and 40% of pigs have hydatid, there are two further well defined foci of high incidence in France. According to Bailenger (1957 a & b) hydatid is common in the Basses-Pyrénées and Landes. He records that 20% to 40%, 10% to 20% and 3% to 10% of cattle, sheep and pigs harbour cysts. He also records 159 human cases between 1945 and 1953 in these regions with an average index of 5.3 (Basses-Pyrénées) and 2.4 (Landes) per 100,000 of the population. Observations by Vuillaume (1957) indicate that a low incidence of hydatid occurs in most departments in France and that the pig is the major intermediate host. In Parisian abattoirs only 2.1%, 0.34%, 0.03% and 0.43% of the livers of pigs, cattle, sheep and horses are condemned for hydatid.

Spain and Portugal: The evidence available indicates that hydatid is common in the Iberian Peninsula, but varies in intensity in different regions, Calvo Melendro (1951), Torrens Pastor (1954), Martínez Pastor (1954 & 1955), Corzo León (1955), Álvarez-Betes (1954 & 1955), Santiago Luque & Zarazaga Burillo (1955), Barros Santos & García Soria (1955) and Herrero Ayllon (1955). Sáiz Moreno (1953 & 1957) in his reviews records high incidence in cattle and sheep in Cordova, Valladolid, Ciudad Real, León, Navarra, Soria and in the Balearic Islands. The incidence recorded at Zaragoza was 39.8%, 10.8%, 8.8% and 10.6% in cattle, sheep, pigs and horses respectively. The average incidence in dogs was 34.4%. No complete records are available on the incidence in man, but Maccas (1957) concludes that in Spain there may be between 1,000 and 1,200 cases occurring yearly. Hydatid, although common in the Balearic Islands, is rare in the Canary Islands (Bosch Millares 1951).

Hungary: Hungary may be the northern limit of the high incidence belt stretching from the Mediterranean Littoral through Greece, Bulgaria, Albania, Yugoslavia and Rumania. Boray (1954) found 8% of dogs affected in Budapest and records in the two decades prior to 1950 an incidence varying between 16.2% to 55% in pigs, 10.3% to 14.45% in cattle and 0.47% to 12.87% in sheep. At the present time the incidence in man is not known.

U.S.S.R.: Gaenko (1958) records that hydatidosis in man and domestic animals is severe in certain regions of the Altai territory. Geller (1957) records between 3.9% and 19% of cattle and 2% to 8.7% of sheep with hydatids in parts of the Ukraine. Mozgovoi *et al.* (1956) record 11.9% and 52% of cattle and sheep affected in the Amu-Darya delta and Murgab river basin. Bondareva (1953) found between 6.6% and 10.4% of dogs affected in the Alma-Ata region and Nikitin (1958) observed up to 55.5% of dogs affected in Dagestan. As well as dogs, wolves play a major role in some districts, for example Kazakhstan (Bondareva 1955).

Minor centres: No major surveys have recently been recorded in the remainder of Europe. Although *E. granulosus* appears to be present in most other countries (FAO 1958), the evidence available from regional observations, for example Hubinger (1958), Kniewallner (1955), in Austria and Stefański & Gerwel (1957) in Poland, suggests that pigs may play the major role in maintaining the cycle at a low level of intensity. Hemmes (1959) records that autochthonous cases in man have not recently been observed in the Province of Utrecht (Netherlands) but the parasite is occasionally observed in cattle. It is apparent that *E. granulosus*, although present, has not been a serious health or economic problem in northern continental Europe during the last decade. Hydatid is no longer a health problem in Iceland (Dungal 1957), but the parasite was observed in sheep as recently as 1955 (FAO 1958).

There are at least two regions, however, which may, on further survey work, reveal hitherto unrecognized foci of relatively high incidence, namely in Northern Scandinavia and in Great Britain. In the former region, although only 47 human cases were recorded between 1857 and 1956, 34 of these were recorded during 1951-56 in Finnmark and Northern Troms (Skjenneberg 1959). Myrseth (1956) records 11 lung cases in Finnmark. Rein (1957) records that 13 persons were found with pulmonary cysts out of about 1,000 persons examined by X-ray in Finnmark. The main cycle according to Skjenneberg involves the dog and the reindeer. During the 1956-58 killing seasons, 9.6% of reindeer were affected with lung cysts only.

In Great Britain there have been no surveys defining major passage hosts, distribution or in fact the species of *Echinococcus* involved, despite the fact that there were 175 deaths from hydatid during the decade 1940-49. Lewis (1953) and Jonathan (1960) record an endemic focus in Wales. That Wales is not a new focus is illustrated by the fact that 178 clinical cases were admitted to Welsh hospitals between 1926 and 1936 (Howell 1938, Wolfe 1943). Between 1931 and 1935 inclusive 35 deaths from hydatid occurred in Wales, 103 in England and two in Scotland. Robinson (1960) estimates there may have been 1,000 clinical cases between 1945 and 1957. He does not estimate, however, the number of autochthonous cases, but in a series of 71 Welsh lung cases Barrett & Thomas (1952) record that 90% were of local origin. In addition to Wales, Taylor (1960) indicates that up to 50% of sheep may be affected in the Hebrides. Wright (1960) found 16 (37%) of 43 harriers (used for hunting hares on foot) infected with *Echinococcus* in Somerset. He indicates that this high incidence of infection may be due to the practice of selecting condemned slaughterhouse offal as an economic source of dog food. *Echinococcus* infections have also been recorded in England during the present decade in a horse (Miller & Poynter 1956); in Ireland, in a horse and cow (Anon. 1951), in man (Dales 1955) and in a dog (Smith 1955).

AFRICA

Major centres: Complicated sylvatic and compound cycles occur in parts of the African continent involving not only a wide range of predator-prey relationships, but also involving different species of *Echinococcus*. These relationships have yet to be determined.

North Africa: Reviews by Senevet (1951), Cousi (1951), Vaysse (1955), Merle (1955), Lacroix *et al.* (1955) and Jore D'Arces (1953) refer mainly to the periods prior to 1950. They indicate, however, that hydatid is wide-spread in domestic animals. Senevet records 43% and 30.5% of sheep and cattle affected in Morocco, 23% and 21.8% of cattle and sheep affected in Algeria and up to 100% of older cattle infected in Tunisia. No recent records are available on the incidence in man.

Central and East Africa: Ginsberg (1956) recently observed that the incidence of hydatid amongst European stock was 17·6% (sheep) and 28·2% (cattle) and amongst African stock 41·1% (sheep) and 41·9% (cattle) and Wray (1958) records some observations on human hydatidosis in Kenya. According to FAO (1958) a high incidence is also found in stock in Bechuanaland. It may well be that certain African colonies and protectorates in which *Echinococcus* is not yet well recognized may prove to be centres with exceedingly high incidences in man.

South Africa: Earlier this century hydatid was quite common in South Africa. No recent surveys have been undertaken, but De Villiers (1957) refers to hydatid in man as of still relatively common occurrence, but also includes "Malkopsiekte" as hydatid disease. The aetiological agent of this latter is *Multiceps multiceps*.

Minor centres: According to Eddin (1955) and Halawani (1956), hydatid is observed in 31% of camels, 1·3% of sheep, 16% of buffaloes and 10% of cattle in some regions of Egypt. The major source of infection appears to be the Upper Sudan. It is not commonly recognized in man. The parasite is also frequently observed in camels in Ethiopia and Libya (FAO 1958).

E. granulosus was recently recorded from Portuguese East Africa. Santos Dias (1954) observed that 68 (0·2%) of 2,293 livers of cattle were condemned for hydatid at Lourenço Marques.

ASIA

The belt of high incidence occurring in Yugoslavia, Greece and Bulgaria continues through Turkey and the Lebanon and present evidence suggests it stretches well into countries of the Middle East.

Major centres

Turkey: 220 clinical cases were recorded in 1955 (Oytun 1957) and 327 cases were registered in 1958 (Yasarol 1960). Hydatid is found in 0·3% of all human autopsies. The incidence in sheep (59%) and cattle (62·4%) is similar to that found in Bulgaria.

Near and Middle East: In 1951 Pipkin *et al.* reviewed the hydatid problem in the Levant before 1950. They reported 385 hospitalized cases from this region in the previous 25 years, but admit this number only represents a proportion of infected individuals. In their review they also record variations in incidence in sheep (4·5% to 41·4%), in cattle (8·4% to 47%) and in camels (67·4% up to 100%); and note that up to 33% of dogs carried *E. granulosus*. Makhlof (1957) suggests that hydatid disease is commoner in Lebanese than in Syrians. Wertheim (1957) records that after the establishment of the State of Israel, there were 268 cases of human hydatid between 1951 and 1954. Most of these (80%) were, however, not autochthonous cases. In 1956 only 0·8% of local cattle were affected. It appears that Israel is only a minor focus of hydatid, bordered by an endemic region of higher incidence, the extent of which is not known. Apart from Israel and Turkey the distribution and incidence of *E. granulosus* during the last decade has not been well defined in Asia, although there is some evidence suggesting that the parasite is widely distributed in Iraq (Shammas 1954), Saudi Arabia (Tarizzo 1957), Afghanistan and Iran (FAO 1958).

Minor centres: Elsewhere in Asia *E. granulosus* is not recorded as a common parasite although it occurs in Japan (Yamashita *et al.* 1956) in Ceylon (Paul *et al.* 1957, Dissanaik 1957 and Gabriel 1957) and in Laos, Cambodia and Thailand (FAO 1958). Reddy *et al.* (1959) suggest that the parasite may, on further observation, prove to be commoner in India than present published work indicates. Lubinsky (1959) in a limited survey, observed hydatid cysts in goats (2·1%), sheep (4·6%) and cattle (15%) in Western Pakistan.

OCEANIA

Australia: Incidence varies in a manner similar to that found elsewhere. The belt of wide-spread high incidence includes Tasmania and parts of the eastern and southern States of the Australian Continent. In Western Australia for example with 13 million sheep

E. granulosus is uncommon. From the evidence available, Gemmell (1958a & 1959b) considers that the incidence and distribution of *Echinococcus* in Australian domestic stock during the 1950 to 1959 decade is similar to that found previously. White (1958) considers that mortality, and Dew (1953) considers that morbidity in man has fallen since the turn of the century in Australia.

Regional surveys by Pullar & Marshall (1958) and Peisley (1956) showed that an average of 12% of cattle in Victoria and 30% of sheep in the Australian capital territory were affected. Gemmell (1957, 1958b & 1960a) found an incidence in domestic food stock in eastern New South Wales similar to that in New Zealand, but the incidence was very much lower in the western districts. The incidence of *E. granulosus* in dogs in the zone of high incidence varied from 20% to 40% in rural dogs and 5% in urban dogs.

A sylvatic cycle involving dingoes and wallabies was first described by Durie & Riek (1952) in Queensland. They consider that the dingo is responsible for accidental infections of up to 60% of cattle in some regions. This cycle also occurs in New South Wales (Gemmell 1959c) but is restricted in distribution. The incidence of infection in dingoes was 81.8% and 47.6% in Queensland and New South Wales respectively.

New Zealand: Due to the wide-spread high incidence, New Zealand (6.2) has a higher death rate from hydatid disease per million of the population than either Australia (2.2) or the United Kingdom (0.3) although, according to Foster (1958), the annual numbers of deaths are similar being 13.2, 19.6 and 12.6 respectively. Foster (1958) records also that the parasite is found five times more frequently in Maoris than in Europeans and the annual number of new cases was 88.4 between 1950 and 1956. According to McCarthy (1957) incidental hydatid lesions were found in 1% of a sample of human autopsies between 1955 and 1957. The approximate annual index (2.1) of clinical cases per 100,000 of the population is higher than that recorded for Italy, but lower than that of Yugoslavia.

The incidence during 1958 varied from 9.7% to 90%, 9.4% to 74% and up to 33.3% in sheep, cattle and pigs respectively according to age at slaughter (Gemmell 1960b). During this period up to 40% of rural dogs were affected in some areas but the average for New Zealand was 9% (Gemmell 1958a).

SOUTH AMERICA

The belt of high incidence includes countries bordering the River Plate and Chile. According to Pérez Fontana (1949) over 13,270 clinical cases were recorded between 1935 and 1945. This figure may be approached by the combined totals from countries of the Mediterranean Littoral, but is nearly ten times higher than that recorded on the Australian Continent.

Major centres

Uruguay: In the present decade 40% of dogs (Pou & Gonzales 1951), 32% of cattle (Bregante 1951) and 100% of old sheep (Bush 1956) were affected. Uruguay is one of the few continental countries maintaining an over-all wide-spread high incidence of hydatid in stock similar to that found in islands such as Cyprus, Sardinia, Corsica, New Zealand or the Yugoslav State of Dalmatia. This is reflected in the high and similar over-all annual index of clinical cases (17.5) per 100,000 of the population.

Argentina: Regional surveys by Cabella (1950), Argüello de Guerrero (1953) and Cereseto (1953 and 1955) confirm that the high incidence region is more restricted than in Uruguay. Ferro (1957) records over 9,000 clinical cases since 1935 with the major proportion (60%) occurring in the highly populated province of Buenos Aires with an annual regional index (21.6 to 24.6 per 100,000 inhabitants) similar to Dalmatia. The index (3.1) for the whole country, however, is similar to that for Yugoslavia.

Brazil: Machado (1953) and Corrêa (1956) confirm the high incidence belt in the Rio Grande do Sul. The total number of cases recorded up to 1952 in this State was 1,103 (Meneghetti 1953).

Chile: Gajardo Tobar *et al.* (1953), Tagle V. *et al.* (1953) and Wilhelm (1953 and 1957) confirm that a high incidence region still occurs in the central provinces and decreases northwards and southwards. During 1951 Neghme *et al.* (1953) record an average incidence of 23·8%, 11·8% and 18·9% in cattle, sheep and pigs respectively. Neghme *et al.* (1956) note that the incidence in man has doubled from that of the previous decade and record 1,093 new clinical cases during 1953 and 1954 inclusive with 74% occurring in central provinces. The annual index (8·76 per 100,000 population) is similar to that found in Greece.

Peru: *E. granulosus* is not uncommon in parts of Peru. Roman (1956) records an incidence of 40% and 19% in sheep and alpacas respectively in the Peruvian Alps. The incidence in man is not known.

Minor centres: Elsewhere in South America during the 1950 to 1959 decade the incidence appears to be low or still not well recognized. Records during this period include limited surveys in Mexico (Chavarría 1955), Guatemala (Aguilar 1953) and Venezuela (Vogelsang & Barnola 1957).

NORTH AMERICA

There is an endemic focus of *Echinococcus* with an interesting cycle in North America, simulating the dingo-wallaby cycle of Australia but with a very different impact on the health of the native population. This cycle involves the passage of the parasite from wild herbivores to wild carnivores and domestic dogs, especially sled dogs, which form a large and essential group in the economy of northern North America.

The wide-spread nature and intensity or significance of the cycle was relatively unknown until the 1950-59 decade, although records before this (for example Riley 1933 and 1939) indicated that such a cycle existed.

Major centres: Sweatman (1952) concluded that *E. granulosus* may be found where moose (*Alces americana*) and timber wolves occur together in North America. According to Rausch & Williamson (1959) domestic dogs may maintain the cycle with wild herbivores in regions of South Alaska, where wolves are generally absent. Although moose appear to be the major reservoir, other wild animals may play some role. During the last decade various authors have reported hydatid in American elk-wapiti (*Cervus canadensis*), caribou (*Rangifer* spp.), bison (*Bison bison*), white-tailed, black-tailed, mule and coast deer (*Odocoileus* spp.) and mountain goats (*Oreamnos americanus*).

Sweatman (1952) records 36 (62%) of 58 wolves and 17 of 29 moose affected in Northern Ontario. Ritcey & Edwards (1958) record 68% of moose affected in British Columbia. Harper *et al.* (1955) record 29 moose of 96 examined infected in Saskatchewan. Rausch & Williamson (1959) record 20% of 124 moose and 60 (30%) of 200 wolves parasitized with *E. granulosus* in Alaska. Choquette *et al.* (1957) record 9·5% of 1,664 reindeer (*Rangifer tarandus*) with hydatid at Alkavik (N.W.T.). This is similar to the incidence in the same host (9·6%) in Scandinavia.

Meltzer *et al.* (1956) record 187 clinical cases of hydatid in Indians from north-west Canada. Miller (1953) records 141 clinical cases of which 90% were in northern British Columbia, Alberta, Yukon and the North-West Territory. Of these, three cases were Eskimos, 136 Indians and only two occurred in the white population. Wolfgang & Poole (1956, a & b), in their survey, skin tested 2,022 natives in North West Canada and found 31% with positive reactions. Of 229 Indians of the Dog Rib band tested with an antigen from Australian sources by Miller (1953), all were negative. Wolfgang & Poole retested 198 of these with antigen from Canadian reindeer sources and found 20% with positive reactions. No correlation has as yet been reported between positive skin tests (Casoni) and clinical infections.

The extremely poor hygienic conditions under which some of the natives live undoubtedly contribute to the high morbidity. Poole (1957) states that many of the Indian tribes in Western Canada exist during a good part of the year by hunting wild herbivores. Viscera from these animals would be readily accessible to sled dogs. Miller (1953) and Wolfgang & Poole (1956) each record a 25% infection rate in dogs. This is similar to the incidence found in dogs in Greece and Australasia during the past decade.

Minor centres: Apart from the sylvatic cycle involving moose and wolves in Michigan and Minnesota, from time to time *E. granulosus* is reported in domestic animals and man in the U.S.A. Magath (1950 & 1954), Williams (1953) and Katz & Pan (1956) record that about 40 autochthonous cases only have been recorded in the U.S.A. During 1950-59, autochthonous records of *E. granulosus* in domestic stock and man include those of Franklin & Ward (1953), who observed two heavily affected dogs of 50 examined in Mississippi. Shelton (1953) observed one sheep affected and Brooks *et al.* (1959) review seven possible autochthonous cases in the same State, five of which were observed in the 1950 to 1959 decade.

There is evidence therefore of a persistent low incidence simulating that found in northern continental Europe, where pigs rather than sheep assume the role of the major passage host. Evidence for this is supported by the observations of Ward & Bradshaw (1956) who observed 348 (4.0%) of 8,066 pigs under two years of age with cysts of *E. granulosus*. They also report 1% of cattle affected in Mississippi.

E. multilocularis

For over a century an academic controversy existed (often known as that between the Unicist and Dualist theories) as to whether or no the alveolar form of *Echinococcus* was in fact a separate species or a pleomorphic form of *E. granulosus*. The solution, as with all scientific controversies, depended on the results of experimentation. It was necessary in the first place to identify the aetiological agent, and then to follow the cycle through to its logical conclusion. Both the aetiological agent (*E. multilocularis*) as well as the usual cycles have been determined in the last decade by Rausch & Schiller (1954) in North America and Vogel (1955, 1957 a & b and 1960) in Europe.

E. multilocularis has been recorded as occurring in man in many regions including Australasia. Mistaken identity may account for these records as *E. granulosus*, in its cystic stage in man and domestic animals, may undergo a pleomorphism simulating macroscopically the true alveolar form of *E. multilocularis*. For this reason, the existence of *E. multilocularis* in a geographical region in this review only takes into account observations in those countries where the parasite has been described in the normal definitive and secondary animal hosts. Further observations may reveal a more wide-spread distribution (for instance Turkey) where Oytun (1957) describes 11 human cases.

EUROPE

The first record of *E. multilocularis* as a natural infection in an animal host in Europe was that of Schulte (1950), who records an hydatid of the alveolar type in a swamp beaver (*Myocastor coypus*) in south Germany where alveolar hydatid disease is well known in man. Vogel (1955 & 1960) in his survey of 991 mouse-like animals in south Germany and Switzerland found four common field voles (*Microtus arvalis*) of 49 infected with the larval stage and records eight out of 20 foxes infested with the adult worms. Mendheim (1955) observed a fox in upper Bavaria with 150,000 echinococci. In view of the large worm burden, hosts parasitized and geographical region, Mendheim's record may be regarded as *E. multilocularis*. Schmid (1958) records that 70% of the 127 clinical cases recorded in Switzerland between 1926 and 1955 were due to *E. multilocularis*.

In Great Britain, Walshe (1954) records an autochthonous alveolar hydatid in man. Sinclair (1957) records *Echinococcus* in foxes which he suggests may be *E. multilocularis*. These worms were lost before the significance of this record was appreciated and identification confirmed. As no intermediate hosts (although suitable hosts are available) have been recorded with the larval form and as Ortlepp (1934) described *E. cameroni* differing morphologically from *E. multilocularis* in a British fox, Sinclair's record only suggests, but does not conclusively prove, the existence of *E. multilocularis* in Great Britain.

In the U.S.S.R. *E. multilocularis* has a relatively wide distribution in foxes (Gevorkian 1958) and in man (Gaenko 1958). Chirkova *et al.* (1958) record 40% of foxes affected in the Tundra zone. Romanov (1958) records an average of 55.9% and up to 70% of foxes parasitized in regions of Siberia.

NORTH AMERICA AND FAR EAST

The first observations of *Echinococcus* in intermediate animal hosts in this region were those of Barabash-Nikiforov (1938) who observed 50% of field-mice (*Clethrionomus rutilus*) affected with "*Taenia Echinococcus*" on the Commander Islands of the Bering Sea. In the first reports of Rausch & Schiller (1951) and Yamashita (1956) this parasite is described as *E. granulosus*. Subsequently it was realized by Rausch & Schiller that this species differed from *E. granulosus* (1954) and they designated it *E. sibiricensis*. Since that time it has been determined by Rausch (1956) and Vogel (1957b) that *E. sibiricensis* is conspecific with the Eurasian form.

During the past decade considerable studies have been contributed on geographical distribution, hosts involved and taxonomic considerations (Thomas 1955, Thomas *et al.*, 1954 and Thomas & Babero 1956 a & b, Schiller 1954 and 1955, Rausch & Schiller 1954, Yamashita 1956) as well as histogenesis and histopathology (Rausch 1954, Mankau 1956 a & b, and 1957, Rausch & Jentoft 1957, Yamashita *et al.* 1958 a & b).

Rausch (1952) suggests the parasite was introduced into Bering Island in about 1870 when rodents were established to provide food for foxes. Subsequently, according to Inukai *et al.* (1955) and Rausch & Yamashita (1957), the parasite was introduced into the Kuriles from Bering Island and into the Japanese Island of Rebun in 1924 with the introduction of blue or arctic foxes (*Alopex lagopus*). Ambo *et al.* (1954) observed one cat infected of 57 autopsied. Since that time 30 clinical cases have been recorded in Rebun the first occurring in 1937, 13 years after the introduction of foxes.

A natural introduction of the parasite occurred on St. Lawrence Island from foxes or rodents from Siberia by way of ice flows. Rausch (1957) reports that 12% of dogs in 1951 and 100% of foxes surveyed in 1955 were infected. Complement fixation tests on 35 of 233 Eskimos proved to be positive but only 2% of natives exhibited clinical symptoms. Complement fixation tests were positive on 10% of 3,000 military personnel living for a year or less on the Island. Rausch suggests that this larval cestode may persist long enough to evoke sensitization in a majority of people but not long enough to evoke recognizable disease in most.

Besides Rebun, Kuriles, Commanders and St. Lawrence Island, *E. multilocularis* occurs in mainland Alaska (U.S.A.) but has not been recorded elsewhere on the North American Continent.

Conclusions

As more and more of the major plagues of animals and man are brought under control and standards of education and health services rise, those diseases causing less spectacular losses assume an increasingly important role as health and economic problems. As a result of this, cestodes common to man and animals are receiving a more thorough investigation. The results of these investigations show that *E. granulosus* is almost cosmopolitan but that its incidence varies markedly within each geographical region being dependent, amongst a multitude of factors known and unknown, on predator-prey relationships sometimes influenced by animal husbandry practices and sometimes completely independent.

Major advances in knowledge on the epizootiology of *Echinococcus* have been contributed during the decade under review. The most significant of these are the identification of *E. multilocularis* and subsequent studies on its distribution, pathology and hosts, and the exclusion of the fox as a host of *E. granulosus*; reappraisal of the public health significance of hydatid disease in countries of the Mediterranean Littoral; the recognition of a sylvatic cycle involving the dingo and wallaby in Australia; the recognition of the extent of the wild herbivore-carnivore cycle in North America and primary recognition of this infection as a health problem amongst Indians and Eskimos.

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BOOK REVIEWS

FRANKLIN, M. T. & HOOPER, D. J., 1959. [Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, U.K.] "Plants recorded as resistant to root-knot nematodes (*Meloidogyne* spp.)." Technical Communication No. 31, Commonwealth Bureau of Helminthology, St. Albans. **Farnham Royal: Commonwealth Agricultural Bureaux**, 33 pp.

This publication consists of a catalogue of plants showing complete or partial resistance to *Meloidogyne* spp. Quick reference to plants is facilitated by listing them alphabetically and under each nematode. Resistance in this work is based upon failure of larvae to enter the plant root, failure of establishment after entry into the root, or failure to complete their cycle. Partial resistance is also indicated referring to reduction of the rate of reproduction of the nematode in relation to the degree of soil infestation. References are given to authors who have recorded the resistance of various plants to the genus *Meloidogyne* and on whose information this compilation is based. A practical man faced with the problem of selecting root-knot resistant plants for use in crop rotation or as trap-crops would have been assisted by the inclusion of a list giving scientific and common names of plants known to be undoubtedly resistant. Franklin & Hooper have given an extremely useful book of reference for research and advisory workers who may either investigate doubtful criteria or recommend certain plants for crop management.

H. Jacks

GOODEY, J. B., FRANKLIN, M. T. & HOOPER, D. J., 1959. [Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, U.K.] "Supplement to 'The nematode parasites of plants catalogued under their hosts' 1955-1958." **Farnham Royal: Commonwealth Agricultural Bureaux**, 66 pp.

This work is a supplement to the revised edition (1956) of "The nematode parasites of plants catalogued under their hosts" by Goodey, Franklin & Hooper. It is a major contribution to the knowledge of nematology and extremely useful to workers in this field. It should stimulate interest not only in nematology but also in the over-all study of botany and plant pathology to which the information given is closely related.

H. Jacks

HOEPLI, R., 1959. "Parasites and parasitic infections in early medicine and science." **Singapore: University of Malaya Press (London: Oxford University Press)**, xiv+526 pp.

In this fascinating and scholarly work Professor Hoepli has brought together an immense amount of information concerning the early history of parasitology and knowledge of an attitude to parasites in ancient times. The book is richly endowed with quotations from early Chinese, Greek, Roman, Italian, French and German works, many of them rare. Helminths bulk largely in the text, although the treatment is comprehensive and covers the whole field of parasitology. Professor Hoepli is to be the more heartily congratulated on having produced this volume in that the preparation of the book was carried out in Singapore where library facilities are limited, particularly with regard to early western literature. Special stress has been laid on oriental lore and writings and this contributes to counter-balancing the occidental bias which tends to prevail in current ideas of early parasitology owing, principally, to the inaccessibility of oriental sources to western students and writers.

The book is divided into three sections. Part one consists of eleven chapters and deals with the knowledge of parasites from ancient times to the middle of the 17th century.

Among other topics treated may be mentioned known clinical symptoms; treatment and prevention of parasitic infections; assumed origin of parasites and the doctrine of spontaneous generation; pathogenicity wrongly attributed to parasites; supposed beneficial effect of parasites; pseudo-parasites and erroneous conceptions of real parasites; imaginary parasites and their role in medicine; and use of parasites for therapeutic and cosmetic purposes. There is also a particularly interesting chapter on early illustration of parasites.

In the 12 chapters of Part two some special parasitological subjects of historical interest

are singled out for particular attention. Of interest to helminthologists will be the chapters on leeches in Chinese medicine and on Chinese anthelmintic prescriptions. Early views on parasites and parasitic infections among the peoples of Borneo, Malaya, China, Fiji and Tahiti are discussed. Other chapters of particular interest are those on parasites and parasitic infections in relation to religion, and on the role of the moon in biology and medicine with special reference to parasitic infections. This section concludes with a short but detailed and illuminating chapter on exchange of knowledge and ideas regarding parasitic infections in past times.

Part three gives a brief outline of the increase of knowledge of parasites in the west from 1650 to 1850.

An appendix contains some remarks on the role of parasitic diseases in history.

The book is well documented and each chapter carries its own comprehensive bibliography. There are 23 plates and adequate subject and author indexes. Helminthologists will find much of value and even amusement in this book. A wealth of information is given on early anthelmintic drugs and prescriptions. Acupuncture and moxibustion, which have been much to the fore in some recent Chinese writings, are explained and discussed. On the lighter side, reference is made to the use of leech extracts for dyeing hair black, for depilatory purposes and strangely enough also for the treatment of alopecia; to the use of human *Ascaris* extract as an aphrodisiac; to the acoustic sense of tapeworms and the expulsion of these parasites by the noise of a Jew's harp; and to the mediaeval controversies as to whether Adam and Eve in paradise had worms and, if so, how these worms were transmitted from Adam by the rib at the creation of Eve.

In the preparation of the Chinese sections of the book Professor Hoeppli had the assistance of Chinese scholars.

J. M. Watson

HOPPER, B. E. & CAIRNS, E. J., 1959. "Taxonomic keys to plant, soil and aquatic nematodes." **Auburn, Ala.: Alabama Polytechnic Institute**, 176 pp. [Mimeographed.]

This set of keys culled mainly from the published literature covers most of the published species in the Secernentea [Phasmidia] and Adenophora [Aphasmidia] of the soil and fresh-water nematodes. The orders covered within these limits are: Spirurida, Rhabditida, Tylenchida, Chromodorida, Enoplida and Dorylaimida. There is an extensive bibliography but no figure.

J. B. Goodey

PESSOA, S. B., 1958. "Parasitologia médica." **Rio de Janeiro: Livraria Editôra Guanabara**, 5th edit. revised, 1124 pp.

SKRYABIN, K. I., 1959. [Gelmintologicheskaya Laboratoriya, Akademiya Nauk SSSR, Moskva, U.S.S.R.] [Trematodes of animals and man. Principles of trematodology. Volume XVI.] **Moscow: Izdatelstvo Akademii Nauk SSSR.**, 706 pp. [In Russian.]

This 16th volume of Skryabin's Monograph is in four sections. In Section I, Skryabin characterizes (i) the Faustulidae contained in the suborder Faustulata and order Faustulida (the endings of the names of the order and suborder are emended to agree with those generally accepted in Russian literature); (ii) the Schistorchidae, which he subdivides into the Schistorchinae n.subf. containing *Schistorchis*, which is characterized by the absence of a lymphatic system, and the Apocreadiinae containing *Apocreadium* and *Choanodora*, with a lymphatic system; and (iii) Callodistomatidae in which he includes *Callodistomum*, *Braunotrema*, *Cholepotes*, *Prosthenhystera* and *Teratotrema* but, disagreeing with Yamaguti (1953), refers *Cylindrorchis* to Cylindrorchidae, *Diplangus* to Zoogonidae (subf. Steganodermatinae), and *Parantorchis* to Fellodistomatidae (subf. Antorchinae). He adds to the Monodheliidae (iv), which was reviewed in Vol. VII, the two species from *Arius* described by Yamaguti in 1952, and to the Opistholebetidae (v) two species omitted on its revision in Vol. IX. Section II contains the fifth part of Skryabin & Gushanskaya's revision of the Hemiurata dealing with the Accacoeliidae. The family is subdivided into five subfamilies on the structure of the terminal section of the genital apparatus in conjunction with the structure of the vitellaria. These are: (i) the Accacoeliinae containing *Accacoelium*, *Accacladium* and *Accacladocoelium*;

(ii) Rhynchopharynginae containing *Rhynchopharynx* and *Paratetrochetus*; (iii) Orophocotylineae containing *Orophocotyle*; (iv) Guschanskianinae n.subf. containing *Guschanskiana* n.g., erected for *Accacladocoelium alveolatum* because of the presence of a hermaphrodite sac and the very characteristic structure of the vitellaria; and (v) Tetrochetinae containing *Tetrochetus*, *Mneiodhneria* and *Caballeriana lagodovsky* n.g., n.sp., which is erected for the specimens described by Lloyd in 1938 as *Odhnerium* (= *Mneiodhneria*) *calyptrocotyle*. In an addendum the revision of the Hemiurata is brought up to date with regard to work published in the last two or three years outside Russia. *Myosaccium ecaude*, which was described by Montgomery in 1957 but not classified within the Hemiurata, is now placed in Myosacciinae n.subf. of Lecithochiriidae. Skryabin & Gushanskaya agree with La Rue (1957) who has erected the suborder Azygiata for the superfamily Azygioidea (Hirudinellidae, revised in Vol. XIII), but not that this suborder should be placed in Strigeatoidea (Strigeidida). This part concludes the systematic revision of the Hemiurata; a description of the morphology, biology, etc. will be found in the following volume. Section III is the first part of a revision by Sudarikov of the order Strigeidida nom.nov., which replaces Strigeata, the name proposed by Skryabin & Shults (1937) for La Rue's (1926) Strigeatoidea. The Strigeidida is divided into two suborders, Strigeata and Cyathocotylata n.subordo; Strigeata is further subdivided into three superfamilies, Strigeoidea, Diplostomatoidea and Proterodiplostomatoidea n.superf. This first part is concerned with the Strigeoidea which contains two families, Strigeidae and Duboiselliidae n.fam., erected for Duboiselliinae with the type and only genus *Duboisella*. The Strigeidae includes four subfamilies: (i) Strigeinae with the genera *Strigea*, *Apharyngostrigea*, *Chabaustrigea* n.g. (erected for *Strigea geodubosi*), *Ophiosoma* and *Parastrigea*; (ii) Cotylurinae n.subf. containing *Cotylurus*, *Apatemon*, *Australapatemon* n.g. (erected for *Apatemon intermedius*, its cercaria becoming *Cercaria Australapatemi intermediae* n.comb.), *Cardiocephalus*, *Cardiocephaloides* n.g. (erected for *Cardiocephalus brandesii*), *Nematostrigea*, *Pseudostrigea* and *Schwartzitrema*; (iii) Codonocephalinae n.subf. erected for the genus *Codonocephalus*; and (iv) Pseudapatemoninae n.subf. erected for *Pseudapatemon*. Other changes made in the Strigeidae are: *Strigea sphaerula intermedia* n.subsp. is proposed for *S. intermedia* Szidat, 1932; *S. eroliae* is transferred to *Pseudapatemon*, and *Apatemon pandubi* to *Pseudostrigea*; *Tetracotyle crystallina* as the metacercaria of *S. sphaerula* is renamed *T. sphaerula* nom.nov. and *T. ardea* (with its previous names and *T. ornithocystis*) as the metacercaria of *S. falconis* is renamed *T. falconis* nom.nov. *T. bonasae*, which was mistakenly ascribed by Chandler in 1954 to *Alaria* sp., is also made synonymous with *T. falconis*. Sudarikov concludes that Bisseru's (1956) species from the crocodile should find their place within the Strigeidae but for the time being leaves the family Neostrigeidae as an addendum to the Strigeidae. In Section IV, Skryabin & Morozov bring up to date Dollfus' (1950) family Mesocoeliidae, agreeing with his inclusion of this family in the Dicrocoelioidea.

G. I. Pozniak

FILM REVIEWS

"Intestinal Nematode Infection". W. W. Frye, M.D., J. C. Swartzwelder, M.D., Louisiana State University, School of Medicine, New Orleans, Louisiana, U.S.A. Running time: 31 minutes. Sound and colour. 16 mm.

At the last International Congress on Gastroenterology at Leyden (1959), this very interesting film was shown. It provides a succinct summary of the salient clinical, pathological, biological and epidemiological features of five common intestinal helminthic infections of world-wide importance and recent significant advances in chemotherapy, particularly the use of dithiazanine iodide.

"Husk—Its Cause and Prevention". Allen & Hanbury's Ltd., Veterinary Division, Bethnal Green, London, E.2. Running time: 15 minutes. One reel. 16 mm.

This film shows the development of Dictol—the first vaccine against a helminth disease. It commences by giving in diagrammatic form the life-cycle of the lungworm *Dictyocaulus*

viviparus and stressing the economic losses caused each year by this parasite. The vaccine Dictol has been developed as the result of work carried out at Glasgow University on immunity to *Dictyocaulus*. It was shown that after X-irradiation of the third-stage infective larvae of *D. viviparus* the larvae were capable of producing immunity but not of causing active infection when administered to calves. The vaccine is prepared from larvae obtained from experimentally infected healthy calves. On collection the larvae are exposed to irradiation to render them harmless and the vaccine so produced undergoes extensive biological and bacteriological safety tests. It is stressed that calves to be vaccinated must be healthy and that two doses of vaccine are required with a 14-day interval between doses. The animals should not be allowed to graze on infected pasture for another 14 days. Vaccination of older animals is carried out in a similar manner. The vaccine has a comparatively short life and it is emphasized that vaccine must be used before the expiry date.

K. R. Heath

SUMMARY OF REPORTS

[Only those sections relating to helminthology are abstracted.]

BRITAIN. "The Incorporated Liverpool School of Tropical Medicine. 60th Annual Report, 1958-59." Liverpool: 54 pp. (Received 21.1.60.)

The Liverpool School of Tropical Medicine has for many years been a major centre of helminthological research. Current work, as described in this 60th report, is concerned with: the effect of low parasitic infections on the mental and physical fitness of the host (preliminary observations with schistosomiasis in rats); the continued investigations into trichineliasis which were started after the Liverpool outbreak in 1953; the development of *Loa loa* in *Chrysops*, immune reactions of man to the bite of *Chrysops* and the response of immature *Chrysops* to insecticides; the systematics and evolutionary relationships in the filariae of man and monkeys infecting man in the Cameroons and, similarly, the morphology of *Onchocerca volvulus* in man and in animals; several new anthelmintic drugs under clinical trials which have shown promise against certain persistent intestinal worms and a further series of compounds which can be given by mouth is being tried against schistosomiasis. Two cases of interest have been received for treatment, one Arab with several guinea-worms evident at the same time and another with an unusual but distinctive skin lesion due to *Onchocerca volvulus*. Among notable staff changes may be mentioned the retirement of Professor R. M. Gordon in September, 1958 from the Chair of Entomology and Parasitology after an association with the School of over 39 years. He is succeeded by Professor W. E. Kershaw.

G. I. Pozniak

EAST AFRICA. "East African Institute for Medical Research. Report, 1958-59." Nairobi: East Africa High Commission, 32 pp. (Received 19.3.60.)

Research in parasitology was concerned with (i) filariasis, including treatment of the population of Bukiko with diethylcarbamazine and attempts to rear radio-active mosquitoes which could then be used to obtain tagged larvae; (ii) with the distribution of schistosomiasis among schoolchildren in the west side area of Lake Victoria, the occurrence of snail hosts in that area, and attempts to increase the susceptibility of mice to *Schistosoma haematobium* and of guinea-pigs to *S. mansoni* by hydrocortisone injections.

G. I. Pozniak

ENGLAND & WALES, 1960. "University of Birmingham. 30th Annual Report 1958-1959." Birmingham: University Research Committee, 123 pp. (Received 9.3.60.)

In the Department of Zoology and Comparative Physiology, the apparent bilateral symmetry of *Discocotyle sagittata* from trout has been studied. In gastrocotylids from the horse mackerel, a post-oncomiracidial, bilaterally symmetrical, larval stage was shown to precede the asymmetrical development of the adult. Different patterns of fish-lure movements in some

closely related echinostome larvae from pond snails have been related to different patterns of tail musculature.
G. I. Pozniak

INDIA. "Annual Report of the Indian Council of Agricultural Research for 1955-56." Delhi: Manager of Publications, 1959, vi+196 pp. (Received 3.3.60.)

Research in progress during 1955-56 at the Indian Agricultural Research Institute included work on: (i) the life-history of *Schistosoma indicum* of live-stock, its pathogenicity and control, and a technique for the identification of animal schistosomiasis based on the identification of the miracidia; (ii) the effect of various factors (nutritive deficiencies, hormones) on immunity in poultry to *Ascaridia galli*; and (iii) the control of some animal parasites (*Stephanofilaria*, liver-fluke) common in India.
G. I. Pozniak

INDIA. "Annual Report of the Indian Council of Agricultural Research for 1956-57." Delhi: Manager of Publications, vi+209 pp. (Received 8.4.60.)

The Indian Council of Agricultural Research reports in the section on disease control that: (i) in heavily irrigated areas, anti-snail measures such as drainage and copper sulphate spraying are neither useful nor practicable, but that systematic dosing of susceptible animals proved a cheap and helpful measure of controlling liver-fluke; (ii) the poultry helminth scheme to study the effect of vitamin, protein and calcium deficiencies on the resistance of poultry to *Ascaridia galli* and *Heterakis gallinae* was concluded in March; and (iii) that a new scheme has been sanctioned in West Bengal for the study of the life-history and bionomics of four trematodes from domestic animals. The results are given of a number of preliminary experiments on the effect of vitamin A, protein, calcium and phosphorus deficiencies on the resistance of sheep to several helminth infections.
G. I. Pozniak

NEW ZEALAND. "Report of the Department of Agriculture for the Year ended 31st March 1959." Wellington, N.Z.: Government Printer, 174 pp. (Received 21.12.59.)

The parasitology section reports on the toxicity of phenothiazine to lambs when these were drenched during the hot, dry season. About 17% of lambs were lost on individual properties in various districts. Death, due to uraemia, occurred one to ten days after drenching. On post-mortem examination extreme dehydration and bilateral renal papillary necrosis were noted. The total non-protein nitrogen levels in the blood were high. The lambs sought shade and water; recovery of surviving lambs was after six weeks. Trials have consistently failed to reproduce this condition even with ten times the recommended dosage, and drenching in autumn was free of these lesions apparently due to climatic conditions or the age of the lambs. Three outbreaks of photosensitization after drenching with fine-particle phenothiazine are also reported. In one case where the dose was 1.5 fl. oz. (instead of the recommended 1 fl. oz.) 10% of 900 lambs became affected with severe kerato-conjunctivitis and total blindness. In the other two outbreaks, lesions were confined to the top of the head and neck and to the back and sides of the body. These followed drenching of lambs which had been shorn in hot dry weather.
G. I. Pozniak

NORTHERN RHODESIA. "Annual Report of the Department of Agriculture for the Year 1959." Lusaka: Government Printer, 24 pp. (Received 13.6.60.)

An eelworm survey, which is being carried out in co-operation with the nematologist of the Federal Department of Agriculture, was continued and the results may be incorporated in the supplement to a check list of diseases being produced by the Commonwealth Mycological Institute.
G. I. Pozniak

SCOTLAND. "Report on the work of the College for the year ended 30th September, 1959." Glasgow: West of Scotland Agricultural College, 92 pp. (Received 28.4.60.)

Plant Pathology Department. Further work was done on the mechanical application of yellow oxide of mercury against the potato-root eelworm; a first serious outbreak of *Heterodera*

major on oats in West Scotland occurred in North Ayrshire and *Meloidogyne javanica* on cucumber is reported as a new species for this country. **Veterinary Section.** Among the diseases diagnosed in farm stock during the year were parasitic bronchitis and ostertagiasis in cattle; acute and chronic liver-fluke infections, acute fluke disease associated with *Vibrio foetus* infection, nematodiriasis and parasitic gastro-enteritis in sheep; and worm infections, including gape-worm, in poultry. Special investigations included observations on the treatment of hill cattle with hexachlorethane against *Fasciola hepatica* and of hill sheep with phenothiazine against helminths.

G. I. Pozniak

SIMMONDS, F. J. [Commonwealth Institute of Biological Control, Carling Avenue, Ottawa, Ontario, Canada.] **"Report on a tour of Commonwealth countries, April-November 1959."** Farnham Royal: Commonwealth Agricultural Bureaux, 108 pp. (Received 25.3.60.)

This is a report by the Director of the Commonwealth Institute of Biological Control of his visit to seven Commonwealth countries (Pakistan, India, Ceylon, Malaya, New Guinea, Australia and New Zealand) in order to investigate and discuss the possibilities and problems of biological control of various insect and weed pests. Of helminthological interest is the successful introduction into Hawaii from the West Indies of sciomyzid predators, *Sepedon macropus* and *Dictya* sp., which are now being bred and released in that country for the control of snails spreading *Fasciola gigantica*. Similarly, *Gulella bicolor* which feeds on the snail hosts of a fluke in poultry, has been introduced from the Philippines.

G. I. Pozniak

ZANZIBAR PROTECTORATE. **"Annual Report of the Department of Agriculture, 1958."** Zanzibar: Government Printer, 48 pp. (Received 5.4.60.)

Helminthiasis was the cause of the greatest number of cattle ailments treated, second only to trypanosomiasis. It was also important amongst sheep and goats and occurred amongst poultry. An expert from the East African Agriculture and Forestry Research Organization who paid a brief visit to Zanzibar found that most of the principal crops except cloves were affected by eelworms, and that a species of *Belonolaimus* not previously recorded in East Africa was present.

J. M. Watson

ABSTRACTS

When an address accompanies an abstract, it is that of the first author.

MEDICAL HELMINTHOLOGY

Surveys

See also Nos.: 1672, 1691, 1693, 1698, 2329.

1580—BRÁZDOVA, K. & ALDOVÁ-KLĚČKOVÁ, E., 1957. [Hygienický a epidemiologický ústav lékařské fakulty, Brno, Czechoslovakia.] "Zkušenosti s parasitologickým vyšetřováním obyvatelstva provincie Severní Hamgen v Koreji." *Československá Epidemiologie, Mikrobiologie, Imunologie*, **6** (3), 186–187.

6,094 human faecal examinations were carried out in the Province of North Hamgen (Korea) during 1954–55. The incidence of helminths was as follows: *Ascaris lumbricoides* 67·5%; *Trichuris trichiura* 10%; *Ancylostoma duodenale* 5·9%; *Taenia* 1·1%. *Clonorchis sinensis* was found in six cases, *Strongyloides stercoralis* in three cases and *Fasciolopsis buski* in one of the total number of cases. Ascariasis was found in 98% and trichuriasis in 30% of 200 school-children when faecal examinations included concentration methods. Faecal examinations with Fuelleborn's concentration method, carried out among 200 miners (from a nearby lignite pit) revealed, as well as ascariasis and trichuriasis, *Ancylostoma duodenale* infection in 20%. Examination of 3,893 sputa containing blood and those from persons suspected of pulmonary distomiasis (128) revealed the incidence of *Paragonimus westermani* to be 2·2%. N. Jones

1581—CAMPBELL, A. ET AL., 1958. [Escuela de Medicina, Universidad de Chile.] "Educación sanitaria escolar aplicada a la prevención de las parasitosis intestinales." *Revista del Servicio Nacional de Salud*, **Santiago**, **3** (3/4), 397–436.

Campbell *et al.* made a survey of the UNESCO school in Santiago, Chile to ascertain whether conditions there were favourable to the transmission of parasites. They found the children's lavatories in a bad state and short of water and the hand-basins unusable. Faecal examinations of 156 of the 3,035 pupils showed *Ascaris lumbricoides* in eleven, *Hymenolepis nana* in 26, *Taenia* sp. in one and *Trichuris trichiura* in 33. A Health Week was declared in the school and the staff were instructed beforehand on the epidemiology of *Ascaris*, *Taenia* and *Enterobius*. They then passed the information on to the children and the school prepared an exhibition relating to parasitic diseases. A test was given to the pupils before and after the Health Week to examine their knowledge of hygiene in relation to parasitic infections. After the Health Week there was an increase of 27·3% of correct answers. M. McKenzie

1582—COSGROVE, G. E., 1960. [Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A.] "Intestinal parasites in the Panama Canal Zone." *American Journal of Tropical Medicine and Hygiene*, **9** (2), 173–174.

Out of 2,500 faecal specimens examined between 1955 and 1957 using zinc sulphate centrifugal flotation and iron hematoxylin stained smears, the following percentage of helminth infections was found: *Trichuris trichiura*, 12%; *Ancylostoma* spp., 10%; *Strongyloides stercoralis*, 5·8%; *Ascaris lumbricoides*, 4·8%; *Enterobius vermicularis* 0·4%; and *Taenia saginata*, 0·16%. Comparison with previously reported studies suggested that hookworm especially, and also *Strongyloides* infections have been considerably reduced from their former high levels. W. K. Dunscombe

* Titles so marked throughout this number have not been seen in the original.

1583—DELARD, G. ET AL., 1958. [Escuela de Medicina, Universidad de Chile.] "Estudio epidemiológico y parasitológico de la comunidad de Schwager." **Revista del Servicio Nacional de Salud, Santiago, 3** (3/4), 383–397.

Delard *et al.* examined the faeces of 338 persons in the mining and neighbouring communities known as Schwager, 28 km. from Concepción in Chile. They found *Ascaris lumbricoides* in 91 persons, *Trichuris trichiura* in 139, *Hymenolepis nana* in 35 and *Taenia* sp. in six. The estuary providing the water supply was contaminated by the elimination of excreta at many places along its length, some less than 1 km. from the point of intake of the water.

M. McKenzie

1584—KLOETZEL, K. & KLOETZEL, J., 1958. "Considerações sobre as parasitoses intestinais em Gameleira." **Revista Brasileira de Medicina, 15** (7), 458–461. [English summary p. 461.]

814 specimens of faeces from persons living in the Gameleira sanitary district (Pernambuco State) were examined. 574 were positive for *Ascaris lumbricoides*, 319 for *Ancylostoma* spp., 50 for *Strongyloides stercoralis*, 352 for *Trichuris trichiura*, 19 for *Enterobius* and no less than 370 for *Schistosoma mansoni*. 161 of these last-named were in the 3–10 years age group. 80% of all children aged 5 to 10 years and approximately two-thirds of all persons between 10 and 40 years old were positive. 7.5% had mansonian hepato-splenomegaly. W. K. Dunscombe

1585—KUNTZ, R. E., 1960. [APO 63, San Francisco, California, U.S.A.] "Intestinal protozoa and helminths in school children of Dacca, East Pakistan (East Bengal)." **American Journal of Tropical Medicine and Hygiene, 9** (2), 168–172.

Examination of faecal specimens from 300 schoolchildren in three areas of Dacca showed, in addition to numerous protozoa, the following helminth infections in descending order of frequency: *Trichuris trichiura*, *Ascaris lumbricoides*, *Ancylostoma* spp., an acanthocephalan, *Diphyllobothrium* sp., *Hymenolepis nana*, *Fasciolopsis buski* and *Haplorchis taichui*.

W. K. Dunscombe

1586—MARZULLO, F., SQUADRINI, F. & TAPARELLI, F., 1957. [Clinica delle Malattie Infettive e Parassitarie, Università di Modena, Italy.] "Parassiti intestinali in Provincia di Modena. Considerazioni clinico-statistiche su 829 esami di feci praticati fra il 1950 e il 1956." **Bollettino della Società Medico-Chirurgica di Modena, 57** (1), 13–39.

Examinations of faecal samples from 829 persons in the Province of Modena, between 1950 and 1956, revealed the following helminthic infections: *Trichuris trichiura* 7.72%, *Taenia saginata* 6.03%, *Enterobius vermicularis* 5.54%, *Ascaris lumbricoides* 2.53%, *Strongyloides stercoralis* 1.2%, *Taenia solium* 1.08%, *Ancylostoma duodenale* 1.08%, and *Hymenolepis diminuta* 0.48%. About 12% of the total number of persons examined were found to harbour two to five parasite species (helminths and/or protozoans) at the same time. The authors outline therapeutic aspects of the infections.

N. Jones

1587—McCARTHY, D. D., 1959. [Island Territories Research, Otago Medical School, Dunedin C.1, New Zealand.] "The incidence and distribution of intestinal parasites in the Cook Islands." **New Zealand Medical Journal, 58** (328), 749–756.

A survey of the intestinal parasites of man in the Cook Islands was carried out in 1957–58, a total of 1,193 faecal samples being examined. These were collected from two of the southern volcanic islands, Rarotonga and Aitutaki, and from five of the atolls, Manihiki, Penryn, Rakahanga, Palmerston and Pukapuka. The commonest parasites found were *Ascaris* (69.1%) and *Trichuris* (41.2%) which occurred on all the islands surveyed. *Necator* was found only on Rarotonga and Aitutaki (9.3% of the samples taken on these two islands only). *Strongyloides* occurred on all islands (0.9%). Cestode eggs, probably *Hymenolepis* spp., were found in only one sample. On Rakahanga an unidentified trematode egg was found in 31.5% of the samples.

L. K. Whitten

1588—ORDUÑA PRIETO, C., 1957. "Frecuencia de las helmintiasis en la región berciana. Estudio especial de un caso de parasitismo por *Fasciola hepática*." **Revista de Sanidad e Higiene Pública, Madrid, 31** (9/10), 493–515.

56% of 200 persons over ten years old from the region of Bierzo were positive for helminthic infections. 44.5% of the total number harboured only one species and the others harboured

two or more species. Specific prevalence was *Enterobius vermicularis* 21%, *Ascaris lumbricoides* 21%, *Trichuris trichiura* 22.5%, *Ancylostoma duodenale* 0.5%, *Hymenolepis nana* 0.5%, *Taenia saginata* 1.5%, and *Fasciola hepatica* 0.5%. Parasitic infection was clinically apparent in 40% of the positive cases. Piperazine adipate was found to be an ideal treatment for ascariasis, enterobiasis and ancylostomiasis. Its efficacy was not so significant in the case of trichuriasis. Special attention is given in the paper to the single case of fascioliasis.

N. Jones

1589—SQUADRINI, F., ALBERTI, M. & TAPARELLI, F., 1957. [Clinica delle Malattie Infettive e Tropicale, Università di Modena, Italy.] "Osservazioni sugli esami di feci eseguiti nell'Istituto durante l'anno 1955." *Bollettino della Società Medico-Chirurgica di Modena*, **57** (1), 59–62.

Examination of 160 human faecal samples from the Province of Modena in 1955 revealed *inter alia* the following helminth infections: *Enterobius vermicularis* 7.5%; *Trichuris trichiura* 4.37%; *Taenia saginata* 3.12%; *Strongyloides stercoralis* 1.86%; *Hymenolepis diminuta* 1.24%; and *Ancylostoma duodenale* 0.62%.

N. Jones

1590—WEINER, D., BROOKE, M. M. & WITKOW, A., 1959. [Communicable Disease Center, Public Health Service, Department of Health, Education and Welfare, Atlanta, Georgia, U.S.A.] "Investigation of parasitic infections in the central area of Philadelphia." *American Journal of Tropical Medicine and Hygiene*, **8** (6), 625–629.

An intestinal parasite survey of schoolchildren (167 Puerto Rican, 49 Negro and 169 white) was conducted in 1957 in Philadelphia in order to estimate the parasitological situation arising from an increase in Puerto Rican residents. The helminth prevalence rates (no specific counts were made for *Enterobius vermicularis*) were considerably higher in the Puerto Rican children. The most frequent helminths were *Trichuris trichiura* and hookworms which infected 67.7% and 21% of Puerto Ricans. The other species identified were *Ascaris lumbricoides*, *Schistosoma mansoni*, *Hymenolepis nana*, *Strongyloides stercoralis* and *E. vermicularis*. A significant reduction in infection was observed in children after six years residence in the U.S.A. The infections were studied in relation to quality of housing.

G. I. Pozniak

1591—WYSOCKA, F., UMIŃSKI, J., MARGAŃSKA, M. & TOŚ-LUTY, S., 1957. [Zakład Parazytologii, Institut Med. Pracy i Higieny, Lublin, Poland.] "Badania nad stopniem rozpowszechnienia pasożytów jelitowych u ludności wiejskiej na Lubelszczyźnie." *Annales Universitatis Mariae Curie-Skłodowska, Lublin. Sectio D*, **12**, 21–39. [English and Russian summaries pp. 36–39.]

In the years 1953 to 1956, about 2,200 persons (714 children) of the rural population from areas of the Lublin palatinate with poor sanitation were examined for parasites. Of these 71.6% were infected, the most frequent being the helminths *Trichuris trichiura* (21% to 56.6% of the population in different areas infected), *Enterobius vermicularis* (30.8% to 55.1%) and *Ascaris lumbricoides* (15.8% to 41.2%). The incidence of these infections is discussed in relation to age and sex.

G. I. Pozniak

Trematoda

See also Nos.: 2025, 2027, 2032, 2041, 2066, 2100, 2112, 2116, 2140, 2151, 2163, 2169, 2181, 2190, 2191, 2208, 2211, 2217, 2229, 2233, 2234, 2245, 2258, 2259, 2262, 2272, 2277, 2278, 2317.

1592—ABDEL MALEK, E., 1960. [Tulane University Medical School, New Orleans, Louisiana, U.S.A.] "Human and animal schistosomiasis in Khartoum Province, Sudan." *Journal of Parasitology*, **46** (1), 111.

Instalment of agricultural pump schemes has increased the previously low prevalence of *Schistosoma haematobium* in Khartoum Province, Sudan. In an agricultural community in Shambat, single urine examinations showed 102 of 439 boys and 3 of 395 girls to be infected (the low rate among girls is conditioned by social customs). *Bulinus truncatus* intermediaries and the potential hosts, *B. forskali*, occurred in large numbers in irrigation canals in the

area. The author reports the finding of *Biomphalaria rüppellii*, the intermediary of *S. mansoni* for the first time in Khartoum Province. Schistosomiasis *mansoni* has, until now, been unknown there and eight natives frequenting the same canal as the snails were not infected. *S. bovis* also occurs in the Province but is less frequent than *S. haematobium*. G. I. Pozniak

- 1593—ABOU-GAREEB, A. H., 1958. [Epidemiology Department, The High Institute of Public Health, Alexandria, Egypt.] "An epidemiological approach to the control of bilharziasis in Egypt." **Indian Journal of Public Health**, 2 (4), 280-294.

Abou-Gareeb considers at length the past and present position of schistosomiasis in Egypt and the Far East. He discusses its prevalence in relation to the development of irrigation schemes and its control by the prevention of pollution of streams, destruction of miracidia and cercariae, destruction of snail vectors and the protection and treatment of the population. G. I. Pozniak

- 1594—ANANTARAMAN, M., 1959. [Veterinary College, Madras, India.] "On schistosome dermatitis: I. Dermatitis in India caused by cercariae of *Schistosoma spindale* Montgomery, 1906." **Indian Journal of Helminthology**, Year 1958, 10 (1), 46-52.

Anantaraman describes a study of schistosome dermatitis caused by cercariae of *Schistosoma spindale*, emitted by *Indoplanorbis exustus* in Madras. The author notes that *Schistosoma spindale* is the only dermatitis-producing schistosome which has ever been recorded in man as an adult. P. Knight

- *1595—ANON., 1960. [Studies on laboratory and immunological diagnosis of schistosomiasis.] **National Medical Journal of China**, 46 (2), 85-87. [In Chinese.]

- 1596—BABKIN, L. T., 1960. [The epidemiology, diagnosis, clinical picture and treatment of opisthorchiasis in Kamchatka.] **Klinicheskaya Meditsina**, Moscow, 38 (3), 52-56. [In Russian: English summary p.56.]

As the first and second intermediate hosts are absent, indigenous infection with *Opisthorchis* is precluded in Kamchatka. All 45 patients came from the Ob-Irtysh basin and had lived in Kamchatka for two to ten years. Opisthorchiasis had been diagnosed only in four patients before hospital admission; in most cases manifestations of a functionally disturbed nervous system were observed. The patients received two to four doses of 3 ml. to 4 ml. of carbon tetrachloride at 12 to 14-day intervals and also supplementary sedative and supportive treatment. Carbon tetrachloride was administered either by duodenal intubation, after pumping out duodenal contents, or *per os*, followed by a laxative. All patients were discharged in good condition; in 39 of them the stomach at palpation was not at all painful, ova had completely disappeared in 11 cases and were diminished in number in 34 cases. N. Jones

- 1597—BERDONNEAU, R., 1958. "Quelques propos sur une épidémie de bilharziose." **Archives de l'Institut Pasteur de la Martinique**, 11 (1/2), 49-54.

- *1598—CHU, P. Y. ET AL., 1959. [Tartar emetic enteric-coated tablets in treatment of schistosomiasis: report of 210 cases.] **Chinese Journal of Internal Medicine**, 7 (12), 1173-1174. [In Chinese.]

- 1599—DIAZ-RIVERA, R. S., GARCIA-PALMIERI, M. R., RAMOS-MORALES, F. & MARCHAND, E. J., 1957. [Departamento de Medicina de la Escuela de Medicina de la Universidad de Puerto Rico, San Juan, Puerto Rico.] "La esquistosomiasis aguda de Manson. II. El tratamiento." **Boletín de la Asociación Médica de Puerto Rico**, 49 (5), 174-191.

Twelve cases of acute schistosomiasis *mansoni* were treated with fuadin 44 to 115 days after infection. The treatment in no way affected the primary clinical aspects of the disease and early treatment did not prevent focal alterations in the liver and in the large intestine. However, it led to gradual amelioration of the condition and weight gain. The parasites and their oviposition were unaffected by a total dose of 40 c.c. to 60 c.c. of the drug even if this dose was repeated, but oviposition was suppressed for 5 to 12 months by a total dose of 80 c.c. to 100 c.c. of the drug. N. Jones

- 1600**—DIAZ RIVERA, R. S., KOPPISCH, E., RAMOS-MORALES, F., GARCIA-PALMIERI, M. R. & TORREGROSA, M. V., 1957. [Departamento de Medicina, Anatomía Patológica y Pediatría de la Escuela de Medicina de la Universidad de Puerto Rico, San Juan, Puerto Rico.] "La esquistosomiasis mansonica aguda. III. Patogénesis." *Boletín de la Asociación Médica de Puerto Rico*, **49** (6), 201–215.

From observation of 12 cases of *Schistosoma mansoni* infection in the acute phase, it was found (i) that a state of hypersensitivity predominates in this phase and (ii) that the duration of the acute phase of the infection seems to depend on the degree of infection and on the general condition and immunological response of the patient. N. Jones

- 1601**—DIAZ-RIVERA, R. S., RAMOS-MORALES, F., GARCIA-PALMIERI, M. R. & GONZÁLEZ, O., 1957. [Departamento de Medicina y Pediatría de la Escuela de Medicina de la Universidad de Puerto Rico, San Juan, Puerto Rico.] "La esquistosomiasis aguda de Manson. I. El cuadro clínico." *Boletín de la Asociación Médica de Puerto Rico*, **49** (5), 155–173.

Acute schistosomiasis as observed in 12 cases is described as the febrile phase of *Schistosoma mansoni* infection, the beginning of which is characterized by symptoms such as fever, profuse perspiration and diarrhoea. Cutaneous manifestations following the infection were infrequent. The incubation period was of varying duration and asymptomatic. Hanger's test was positive in eleven cases. For diagnostic purposes faecal examination was found to be more useful than rectal biopsy. The importance of eosinophilia, which was markedly increased following treatment with fuadin, is stressed as regards diagnosis. N. Jones

- 1602**—HARINASUTA, C. & VAJRATHIRA, S., 1960. [Tropical Diseases Research Unit, Faculty of Medicine, University of Medical Sciences, Bangkok, Thailand.] "Opisthorchiasis in Thailand." *Annals of Tropical Medicine and Parasitology*, **54** (1), 100–105.

North-east Thailand shows by far the heaviest incidence of *Opisthorchis* infection, a five-year survey involving examination of 263,703 faecal specimens having shown *O. viverrini* in 22%. Metacercariae were found in certain cyprinoid fishes which were very generally eaten raw in that area, while examination of *Bithynia* snails showed cercariae morphologically resembling *O. viverrini*. Clinically, a painful enlarged liver with jaundice was found in many cases with a normal white cell count but eosinophils about 20%. The relationship of the infection to cirrhosis and carcinoma of the liver is mentioned and preventive measures outlined.

W. K. Dunscombe

- 1603**—HSÜ, S. Y. LI & HSÜ, H. F., 1960. [Department of Hygiene and Preventive Medicine, College of Medicine, State University of Iowa, Iowa City, U.S.A.] "On the virulence of the geographic strains of *Schistosoma japonicum*." *American Journal of Tropical Medicine and Hygiene*, **9** (2), 195–198.

The virulence of the Chinese, Formosan, Japanese and Philippine strains of *Schistosoma japonicum* was investigated on albino mice, using infections of 50 cercariae of both sexes and estimating the mean survival time. The Japanese strain was found to be the most virulent, and the Formosan strain the least, with the Philippine strain slightly more virulent than the Chinese strain. The greater the virulence the shorter the prepatent period. In infected mice, in estimating virulence, intestinal haemorrhages should not be regarded as important.

W. K. Dunscombe

- 1604**—IZAAK, A. P., 1960. [Rentgenologicheskoi otdelenie, Omskaya dorozhnaya Klinicheskaya bolnica, Omsk, U.S.S.R.] [Cholecystography in opisthorchiasis.] *Klinicheskaya Meditsina. Moscow*, **38** (3), 56–59. [In Russian: English summary p. 59.]

Izaak carried out cholecystography in 33 cases of opisthorchiasis with light, moderate and heavy infections. Roentgenological examination revealed the shadow of the gall-bladder in 27 cases. Disorders of the gall-bladder reflex, indistinct contours of its shadow, increased bladder capacity and negative cholecystographic results were the most frequent changes observed. Roentgenological alterations of the gall-bladder were found to be directly related to the degree of infection. These alterations were also found to reflect the profound disorders of the resorptive and contractile functions, which develop in the organ in the course of the disease. N. Jones

*1605—LIU, C. S. & CHANG, C. H., 1960. [Seven-day tartar emetic treatment of schistosomiasis; a further report and follow-up observations on 121 cases.] *Chinese Journal of Internal Medicine*, 8 (3), 266–267. [In Chinese.]

1606—MARZULLO, F., SQUADRINI, F. & TAPARELLI, F., 1957. [Clinica delle Malattie Infettive e Tropicali, Università di Modena, Italy.] “La distomatosi epatica nell’uomo. Contributo personale e considerazioni cliniche.” *Bollettino della Società Medico-Chirurgica di Modena*, 57 (5 bis), 718–730.

Marzullo *et al.* describe a case of *Fasciola gigantica* infection in a nine-year-old girl. Clinical symptoms, the evolution of which is described in detail, appeared some years before the patient was taken into hospital. At the time of entry into hospital the basic treatment consisted of emetine and resulted in rapid clinical improvements, the volume and function of the liver returning to normal, and general improvement in physical condition. Over four months after discharge examination of the patient for ova was still negative although eosinophilia was observed.

N. Jones

1607—PITCHFORD, R. J., 1960. [South African Council for Scientific and Industrial Research, Bilharzia Field Unit, Nelspruit, Transvaal, Union of South Africa.] “The value of Triostam in the treatment of schistosomiasis.” *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 54 (2), 178–179.

34 African schoolchildren with double infections of *Schistosoma haematobium* and *S. mansoni* were treated by Pitchford with four daily injections of 334 mg. or six daily injections of 223 mg. of Triostam (trivalent sodium antimony gluconate). Side reactions were seen in only one patient who had severe and prolonged coughing after receiving an increased dose because he had missed a previous injection. Up to six weeks after treatment no viable *S. haematobium* ova could be found but although *S. mansoni* ova were scarce during the fourth and fifth week they were easily found in some patients in the sixth week. Chances of reinfection by both parasites during the investigation were equal so Pitchford concludes that the 23% failure rate with *S. mansoni* could not be attributed entirely to the non-susceptibility of immature worms to the drug and that the response to Triostam is not so good with *S. mansoni* as it is with *S. haematobium*. In a footnote Pitchford reports that of ten Europeans examined two to three months after treatment with Triostam for *S. mansoni* infections, nine were still shedding *S. mansoni* ova in their stools. There had been no question of reinfection.

D. L. H. Robinson

1608—POIRIER, A. & CARRÉ, J., 1959. “Contribution à la connaissance de la bilharziose intestinale à *Schistosoma mansoni* à Madagascar. Etude épidémiologique du foyer d’Ambositra. II. L’infestation humaine.” *Bulletin de la Société de Pathologie Exotique*, 52 (6), 778–785.

In the Ambositra area of Madagascar the number of cases of intestinal schistosomiasis has increased each year since 1951. Inhabitants of the peri-urban areas are more affected than the town dwellers. Stools of 947 of the former were examined in March 1959: in 381 children the percentage positive varied from 4.12 to 58.66, and in 566 adults from certain of the villages the percentage positive ranged from 0 to 53.84. A marked anaemia and, often, albuminuria was found in a number of persons; this improved on antimonial treatment. W. K. Dunscombe

1609—RODRÍGUEZ-MOLINA, R., 1958. [San Patricio Veterans Administration Hospital, San Juan, Puerto Rico.] “Schistosomiasis mansoni. Clinical patterns.” *Boletín de la Asociación Médica de Puerto Rico*, 50 (3), 83–89.

As a result of 25 years’ experience with clinical schistosomiasis in Puerto Rico, Rodríguez-Molina distinguishes three groups of cases: (i) a large group of asymptomatic cases with positive stool tests; (ii) a smaller group of cases with gastro-intestinal symptoms, chiefly episodes of diarrhoea and abdominal pain with or without blood or mucus, or tenesmus; and (iii) a few cases of irreversible visceral disease giving rise to invalidism associated with liver cirrhosis, portal hypertension and hypersplenism, and in which uncontrollable haematemesis from ruptured gastro-oesophageal varices is a frequent cause of death. Cases of acute schistosomiasis and of pulmonary hypertension were rare.

G. I. Pozniak

1610—SAYEGH, E. S. & ISHAK, K. G., 1957. “Adenocarcinoma associated with schistosomiasis in an ectopia vesicae. Report of a case.” *British Journal of Surgery*, 44 (186), 426–429.

- *1611—T'AN, C ET AL., 1959. [Spinal type of schistosomiasis japonica.] **Chinese Journal of Neurology and Psychiatry**, 5 (6), 373. [In Chinese.]
- 1612—THIELE, H. G., 1959. [Bernhard-Nocht-Institut für Schiffs- und Tropenkrankheiten, Hamburg, West Germany.] "Lungenparagonimiasis." **Deutsche Medizinische Wochenschrift**, 84 (15), 752-756. [English summary p. 775.]
- Thiele describes a case of paragonimiasis in a Chinese seaman admitted to the Hamburg Tropical Diseases Institute after having been treated for tuberculosis. *P. westermanni* ova were found in the sputum. Treatment with chloroquine (intramuscularly, 10 ml. of a 5% solution daily for 7 days; orally, 0.25 gm. 3 times a day for 38 days; and by aerosol, 5 ml. of a 5% solution daily for 61 days) was successful and in spite of the high dosage (a total of 47.25 gm. was given) there were no untoward side effects. A. E. Fountain

- 1613—VIGNERON, A. & GUY, E., 1957. "Bilharziose urinaire chez une fille de 8 ans." **Journal de Radiologie, d'Electrologie et de Médecine Nucléaire**, 38 (7/8), 858-859.

Cestoda

See also Nos.: 1725, 1805, 1813, 1842, 1844, 1847, 2043, 2070, 2120, 2122, 2156, 2187, 2189, 2251, 2268, 2269, 2271, 2299, 2300, 2328.

- 1614—ALIEV, A. R., 1960. [Fakultetskaya Khirurgicheskaya Klinika lechebno-profilakticheskogo Fakulteta, Azerbaidzhanki Meditsinski Institut.] [A case of hydatid infection of the pancreas causing extrahepatic portal block.] **Khirurgiya. Moscow**, 36 (4), 113-114. [In Russian.]
- Pre-operationally the complaint in a forty-year-old woman was diagnosed as splenomegaly and portal hypertension, while surgery revealed a hydatid cyst in the tail end of the pancreas. The extra-hepatic portal block was caused through compression of the portal vein by the cyst. G. I. Pozniak

- 1615—ALTMANN, G. & BUBIS, J. J., 1959. "A case of multiple infection with *Taenia saginata*." **Israel Medical Journal**, 18 (1/2), 35.
- Altmann & Bubis report the recovery of 16 scoleces and strobilae of *Taenia saginata*, each measuring 50 to 80 cm., at the post-mortem examination of a 36-year-old woman who had died of severe cardiac insufficiency. They point out that the occurrence of multiple infection with this species is by no means rare in endemic foci. J. M. Watson

- 1616—ARMAND UGÓN, C. V., 1958. "Hidatidosis pulmonar bilateral." **Archivos Uruguayos de Medicina, Cirugía y Especialidades**, 51 (5), 462-465.

- 1617—ASKERKHANOV, R. P., 1960. [Kafedra fakultetskoi Khirurgii, Dagestanski Meditsinski Institut.] [Pulmonary echinococcosis and its surgical treatment.] **Khirurgiya. Moscow**, 36 (1), 31-37. [In Russian: English summary p. 37.]
- Askerkhanov has observed the symptoms in relation to diagnosis and the surgical findings in 62 cases of pulmonary hydatidosis. He recommends that in cases of diagnostic difficulties supplementary tests such as diagnostic pneumothorax, pneumoperitoneum and pneumomediastinography be employed and that the aim should be early surgical treatment using wide thoracotomy and radical intervention, while in the presence of single cysts the method of choice remains the so-called ideal echinococcotomy. G. I. Pozniak

- 1618—ASTROZHNIKOV, Y. V., 1960. [I bolnitsa, Beltsi, Moldavskaya S.S.R.] [Pulmonary echinococcosis.] **Khirurgiya. Moscow**, 36 (1), 37-44. [In Russian: English summary pp. 43-44.]
- Astrozchnikov describes the symptoms observed in 26 persons with pulmonary hydatidosis and gives details of his surgical treatment. G. I. Pozniak

- 1619—BELLO, R. DI, RIMINI, R. & ROCA ESTEVEV, A., 1958. "Quiste hidático de la cara posterior del ventriculo izquierdo con onda Q patológica." **Anales de la Facultad de Medicina de Montevideo**, 43 (3/4), 59-66. [English summary p. 63.]

- 1620**—BELLO, R. DI & VENTURINO, W., 1957. "Quiste hidático del pericardio." *Archivos Uruguayos de Medicina, Cirugía y Especialidades*, **50** (2), 269–284. [English summary pp. 282–283.]
- 1621**—BERRY, E. H. J. & FRANCIS, R. S. R., 1958. "Multiple hydatid cysts of the lung. Report of a case." *New Zealand Medical Journal*, **57** (321), 479–482.
- 1622**—BROOKS, Jr., T. J., HUTCHISON, W. F., SAFLEY, T. J. & ROSS, T. G., 1960. [University of Mississippi Medical Center, Jackson, Mississippi, U.S.A.] "Human sparganosis in Mississippi: report of two cases." *American Journal of Tropical Medicine and Hygiene*, **9** (2), 192–194.
Brooks *et al.* report two cases of human sparganosis, neither patient having been out of the U.S.A. Bobcats (*Lynx rufus*) have been found to harbour adult *Spirometra mansonoides* and it is suggested that the spargana found belonged to the same species. W. K. Dunscombe
- 1623**—CALDERÓN, E., 1959. "Hidatidosis subcutánea—ruptura espontánea de un quiste lumbar izquierdo." *Boletín Chileno de Parasitología*, **14** (4), 85–87. [English summary p. 85.]
The case is reported of a woman from Chile who had a subcutaneous hydatid cyst, in the lumbar region, which ruptured and was subsequently removed by operation. M. McKenzie
- 1624**—CHIRICUTZA, I., MANOLIU FURNICA, C. & ROSNER, D., 1957. [Sanaia, Str. Lenin 55, Rumania.] "Niekóre zagadnienia dotyczące leczenia bąblowca wątroby." *Polski Tygodnik Lekarski*, **12** (43), 1658–1662. [English & Russian summaries p. 1662.]
The authors consider the indications for and against marsupialization and total cystectomy, the two methods most frequently used in the surgical treatment of hydatidosis in man. They then emphasize the advantages of a method described by Goinard in 1952 which combines partial cystectomy with the filling up of the cavity by a portion of the omentum (*epiploon plastica intra-cavitalis*). The case histories of four patients successfully operated upon by this method are presented. G. I. Pozniak
- 1625**—D'AMBROSIO, R., BRUNI, F. & CAVALLI, V., 1958. [Ospedale San Filippo Neri degli O.O.R.R. di Roma, Terza Divisione Tisiologica.] "Pneumotorace spontaneo idatideo." *Lotta contro la Tuberculosis. Rome*, **28** (11/12), 1166–1188.
- 1626**—DONKERSLOOT, T. A., 1958. "Echinokokkose." *Nederlandsch Tijdschrift voor Geneeskunde*, **102** (48), 2372–2377.
Donkersloot presents a general discussion of hydatidosis with remarks on the surgical treatment of the disease in man. Points of medical interest are that in children the cyst is nearly always unilocular and that in later life children may show symptoms of an otherwise inexplicable infantilism. W. K. Dunscombe
- 1627**—FAIN, A. & PIRAUX, A., 1959. "Sparganose chez l'homme et les animaux au Ruanda-Urundi." *Bulletin de la Société de Pathologie Exotique*, **52** (6), 804–808.
A case of sparganosis is described in an African, from the northern part of Ruanda-Urundi, who had a swelling on the inner side of the thigh, a sparganum being removed at operation. The authors consider that the adult is probably one of the two species of *Diphyllobothrium* described from Africa so far, either *D. theileri* from Felidae species or *D. pretoriensis* from Canidae species. They give a list of animals found to be carriers of *Diphyllobothrium*, either as larval forms or adults, in the Belgian Congo and Ruanda-Urundi. W. K. Dunscombe
- 1628**—FINOCCHIARO, S. & LOMBARDO, G., 1957. [Istituto di Clinica Medica Generale e Terapia Medica della Università di Catania, Italy.] "Due casi atipici di echinococco del fegato." *Giornale di Malattie Infettive e Parassitarie*, **9** (12), 1091–1092.
Two cases of hydatid of the liver are described; in one of them the cyst was open into the bile-ducts. This case was diagnosed by hepatic centesis. Clinical symptoms completely disappeared within about three days of treatment with chloroquine. The other case was cured by surgical intervention. N. Jones
- 1629**—GAITÁN-NIETO, A. & TRIBIN-PIEDIAHITA, A., 1957. "Cysticercus in vitreous cavity." *American Journal of Ophthalmology*, **44** (6), 819–820.

1630—GRASSI, G. & CATALANO, G., 1957. "Su di un caso di cisti da echinococco del grande labbro." **Policlinico (Sezione Pratica), Rome, 64** (38), 1383–1384. [English & French summaries p. 1384.]

1631—HILLEMAND, P., PATEL, J., LATASTE, J., PRÉMONT, M. & DURON, J., 1957. "Migration et croissance sous-péritonéale d'un kyste hydatique du foie gauche." **Presse Médicale, 65** (94), 2125–2127.

1632—JONATHAN, O. M., 1960. "Hydatid disease in North Wales." **British Medical Journal, Year 1960, 1** (5181), 1246–1253.

The incidence of hydatid disease in Great Britain is now largely confined to the Welsh area. Jonathan has collected and analysed reports of 44 cases treated in hospitals in North Wales between 1948 and 1957, during which the annual incidence varies very slightly. The sexes were about equally affected. Of these 44 cases the site of infection was the liver in 28 cases, the lung in 13, the spleen in three, the abdominal musculature in one and the peritoneal cavity in three. The results of surgical treatment in 34 cases are tabulated. The Casoni intradermal test was positive in 21 out of 22 cases with liver cysts, in seven out of eleven with cysts in the lung and in both cases of infection of the spleen. The chief source of infection is attributed to stray dogs and the multiplicity of small slaughterhouses, the sale of offal as manure and the occasional slaughtering of infected sheep on farms. R. T. Leiper

1633—LILLO, F. DE, 1957. [Istituto di Clinica Chirurgica dell'Università di Roma, Italy.] "Considerazioni sulle cisti da echinococco polmonari della prima e seconda infanzia." **Archivio Italiano di Pediatria e Puericoltura, 18** (4), 308–321. [French and German summaries p. 321.]

In most of 43 children operated upon for pulmonary hydatid cysts, these were localized in the right lung, especially in the inferior lobe. Evolution of pulmonary hydatid and anatomopathological changes connected with it are described in detail, together with radiological and symptomatological aspects. Pulmonary localization of the cysts is explained by direct migration of the parasite to the lungs omitting the passage through the liver. N. Jones

1634—LLOYD, E. L., 1957. [Tropical Diseases Unit, Eastern General Hospital, Edinburgh, Scotland.] "Tug and tussle with tapeworms." **Practitioner, 179** (1074), 705–707.

Lloyd found both mepacrine and dichlorophen satisfactory in the treatment of tapeworm infection. J. M. Watson

1635—PERRIS, C., 1957. "Cisticercosi del IV ventricolo. Correlazioni anatomocliniche e trattamento neurochirurgico. Con presentazione di un caso." **Rassegna di Neuropsichiatria, 11** (3/4), 129–144.

1636—PETUKHOV, M. I., 1960. [Propedevticheskaya Khirurgicheskaya klinika, Kuibishevski Meditsinski Institut.] [Hydatid of the muscle.] **Sovetskaya Meditsina, 24** (3), 137–138. [In Russian.]

Petukhov has observed the presence of hydatid cysts in the muscles in 10 of 375 hydatid patients, the sites implicated being the abdominal wall, the lower extremities, the thorax and the dorsal longitudinal muscles. Characteristic clinical symptoms were absent. In five patients there was marked eosinophilia, in two the eosinophil count was raised and in three it was normal. Casoni's reaction, applied in four of the patients, was positive. G. I. Pozniak

1637—PODYAPOLSKAYA, V. P., 1960. [Institut meditsinskoi parazitologii i teoreticheskoi meditsini A.M.N., S.S.S.R.] [The eradication of taeniasis in the U.S.S.R.] **Sovetskaya Meditsina, 24** (5), 12–17. [In Russian.]

In her discussion on the eradication of *Taenia saginata* infection in the U.S.S.R., Podyapolskaya reviews the general situation of this infection in the country, while giving some indications and suggestions as to the measures and methods leading to the completion of this task.

N. Jones

1638—QUATTROCCHI, G. & LA ROSA, F., 1959. [Clinica delle Malattie Infettive e delle Malattie Tropicali e Subtropicali dell'Università di Messina, Italy.] "Sul problema diagnostico e terapeutico della cisticercosi cerebrale." *Archivio Italiano di Scienze Mediche Tropicali e di Parassitologia*, **40** (4), 201–216. [English, French & German summaries pp. 214–216.]

Quattrocchi & La Rosa describe a case of cerebral cysticerciasis, localized at the meningo-cortical level of the vault. The patient presented convulsive fits, prolonged loss of consciousness and very high temperature. Other features of the syndrome were increased albumin content of the cerebrospinal fluid and eosinophilia. *Cysticercus cellulosae* were found in the skin. The authors stress the importance of eosinophilia in the cerebrospinal fluid in the diagnosis of cerebral cysticerciasis. Clinical symptoms were rapidly checked with cortisone treatment. Therapy consisting of combined hormonal and antiparasitic treatments is proposed in such cases.

N. Jones

1639—RECHNITZER, P. A., SUTHERLAND, W. & DRAKE, C. G., 1959. [Department of Medicine, University of Western Ontario and St. Joseph's Hospital, London, Ontario, Canada.] "Cysticercosis cerebri." *Canadian Medical Association Journal*, **81** (2), 108–109.

Rechnitzer *et al.* report the case history of a 29-year-old woman with cerebral cysticerciasis. Removal of the single cysticercus brought about complete recovery.

G. A. Webster

1640—REDDY, D. J., RAO, V. K. & MUNISWAMY, M., 1958. [Guntur Medical College, Guntur.] "Hydatid cyst of the spleen." *Journal of the Indian Medical Association*, **31** (7), 289–290.

1641—SANTOS DUBRA, A., 1957. "Quiste hidático del lóbulo izquierdo del hígado abierto en vías biliares. Litiasis hidática concomitante." *Archivos Uruguayos de Medicina, Cirugía y Especialidades*, **50** (4), 516–525.

Santos Dubra describes the clinical, diagnostic and surgical aspects in a case of rupture of a hydatid cyst into the bile-ducts of the left hepatic lobe; there was concomitant hydatidic vesicular lithiasis.

N. Jones

1642—SEMENOV, V. S., 1960. [Glavni Khirurg, Ministerstvo zdravokhraneniya, Yakutskaya A.S.S.R.] [Alveolar hydatid as a regional disease in Yakutsk A.S.S.R.] *Sovetskaya Meditsina*, **24** (2), 57–62. [In Russian.]

In the Yakutsk A.S.S.R. about one person in every 900 is infected with hydatidosis. The disease occurs principally in the indigenous population and is most frequent in the 20 to 30 years age group. Both unilocular and multilocular hydatidosis are known; the latter has been rising since the war and at present constitutes, on an average, 57·2% of the total number of surgically treated hydatid cases.

G. I. Pozniak

1643—TAUB, M., 1958. [Caesarean section in a case of Echinococcus cyst in the pelvic orifice of a young primipara.] *Harefuah*, **55** (1), 16. [In Hebrew.]

Acanthocephala

No relevant abstracts in this issue

Nematoda

See also Nos.: 1835, 1988, 2118, 2023, 2024, 2029, 2054, 2095, 2158, 2164, 2188, 2205, 2215, 2221, 2222, 2226, 2228, 2240, 2249, 2250, 2252, 2253, 2256, 2260, 2264, 2267, 2269, 2270, 2284, 2285, 2286, 2297, 2302, 2305, 2326.

1644—ANON., 1959. "Las enfermedades y su tratamiento: tricocefaliasis." *Revista Kuba de Medicina Tropical y Parasitología*, **15** (1/6), 23–24.

Instructions are given for the treatment of trichuriasis by enemata or by duodenal intubation with a liquid containing hexylresorcinol and glycerin mixed with a powder containing acacia, gum tragacanth and colloidal kaolin, in water.

W. K. Dunscombe

- 1645—BASNUEVO, J. G. ET AL., 1959. [Hospital Universitario General Calixto García, La Habana, Cuba.] "Tratamiento de la strongyloidiasis con dithiazanina." *Revista Kuba de Medicina Tropical y Parasitología*, 15 (1/6), 5-8. [English summary pp. 6-7.]

Eleven children and four adults suffering from strongyloidiasis were treated with dithiazanine as follows: patients weighing over 30 lb. received oral treatment with 50 mg. enteric-coated tablets four times daily after meals; those under 30 lb. were given sugar-coated granules, each gramme of which contained 10 mg. of the drug. In all cases treatment was given daily for ten days. In young children chlorpromazine at a dose rate of 0.5-1 mg. per pound body-weight was given before the drug to lessen side effects. The total dosages ranged from 200 mg. to 600 mg. per day. All were cured.

W. K. Dunscombe

- 1646—BASNUEVO, J. G. ET AL., 1959. [Hospital Universitario General Calixto García, La Habana, Cuba.] "Tratamiento de la tricocefaliasis con dithiazanina." *Revista Kuba de Medicina Tropical y Parasitología*, 15 (1/6), 15-19. [English summary pp. 17-18.]

Four adults and 12 children each weighing over 60 lb. and 16 children each weighing less than 30 lb. were treated for trichuriasis with dithiazanine as above. In the small children (second group) chlorpromazine (0.5 gm. per pound body-weight) was given at the same time. In each group 10 were cured but three patients in the second group were subsequently given hexylresorcinol enemata. The results were much better in those receiving 600 mg. dithiazanine daily.

W. K. Dunscombe

- 1647—BHADURI, N. V., ARORA, U. S. & BANDYOPADHYAY, A. K., 1958. "Parasitological survey of an Indian industrial population. Part III. Incidence of filariasis." *Bulletin of the Calcutta School of Tropical Medicine*, 6 (2), 56.

The clinical manifestations observed in 72 adult Indian males who were examined for filariasis were: hydrocele (18 cases), epididymo-orchitis (16 cases), lymphadenitis (14 cases), lymphangitis (12 cases) and lymphoedema (11 cases). *Microfilaria bancrofti* was found in the thick blood smear (taken between 10 and 11 p.m.) of four men, two of whom showed no symptoms.

G. I. Pozniak

- 1648—BHADURI, N. V., BANDYOPADHYAY, A. K. & ARORA, U. S., 1958. "Helmisan in the treatment of enterobiasis in children." *Bulletin of the Calcutta School of Tropical Medicine*, 6 (2), 72.

Enterobiasis in 21 children, aged two-and-a-half to twelve years, was treated with two Helmisan tablets (one tablet being equivalent to 0.01 gm. of dichlorophenyl-trichlormethylmethane) three times a day after food for three successive days, followed by a saline purge on the fourth day. Only one of the nine children re-examined after a month was cured.

G. I. Pozniak

- 1649—BIOCCA, E., 1959. [Istituto di Parassitologia dell'Università di Roma, Italy.] "Infestazione umana prenatale da *Spirocerca lupi* (Rud., 1809)." *Parassitologia. Rome*, 1 (2), 137-142. [English summary p. 142.]

Biocca describes a case of *Spirocerca lupi* infection in a premature, new-born child, studied by Moretti & Pezzani. The child was born in the eighth month and polyhydramnios was revealed towards the sixth month of pregnancy. Absence of meconium and foetal peritonitis was observed among other symptoms. The child died on the 12th day and in the terminal part of the ileum, a section of which was completely imperforate, five male and female adults of *S. lupi* were found. It is concluded that man can act in the foetal and new-born stage as definitive host of the parasite and that the lesions caused in this case resembled those of spirocerciasis in Canidae with localization of adult parasites in the intestinal wall and lumen.

N. Jones

- 1650—BORSKI, A. A. & TIPTON, R. R., 1958. "Filariasis of testis." *United States Armed Forces Medical Journal*, 9 (5), 740-744.

- 1651—BROWNE, S. G., 1959. [Baptist Mission Hospital, Yakusu, Belgian Congo.] "Incidence and clinical manifestations of onchocerciasis in a focus in the Oriental Province of the Belgian Congo." *Annals of Tropical Medicine and Parasitology*, 53 (4), 421-429.

The incidence of onchocerciasis in the Oriental Province of the Belgian Congo was found to be 17.3% of 45,035 persons. Diagnosis was made on the presence of onchocercomata in

skin snips in 77% and on the presence of dermal microfilariae (without onchocercomata) in 23% of the cases. It is mentioned *inter alia* that *Acanthocheilonema streptocerca* was rarely found. 23.7% of the infected persons had cutaneous involvement. Onchocercal depigmentation was almost entirely confined to the main foci (all four), where it was 5.1% of the total number of infections (5,878). Eye lesions due to onchocerciasis occurred only in hyperendemic foci. In such cases other symptoms such as filarial itch and depigmentation were much more frequent and intense than in cases without eye lesions. Inguino-crural adenopathy was observed in 18.9% of the infected persons in the four foci. A positive correlation between the degree of glandular enlargement and the severity of onchodermatitis was observed. In the districts of high endemicity cases of elephantiasis of the fundus of the scrotum were frequently observed and sometimes also of the corona of the penis. Elephantiasis, however, was rarely pronounced. 5% of *Simulium neavei*, which were very frequent, were found to contain developmental forms of *Onchocerca volvulus*. Investigation of streams revealed clusters of the vector's eggs attached to smooth limonite stones in shallow, rapidly flowing streams. Larvae and pupae were found to be attached to several species of *Potomonautes* crabs.

N. Jones

1652—BUDDEN, F. H., 1960. [The Eye Hospital, Southampton, Hants, U.K.] "Eye lesions of onchocerciasis." [Correspondence.] *Transactions of the Royal Society of Tropical Medicine and Hygiene*, **54** (3), 281–282.

Replying to Rodger's criticism (*Trans. R. Soc. trop. Med. Hyg.*, 1959, **53**, 536–537) Budden is unable to classify the choroïdo-retinal lesions in onchocerciasis into Rodger's two degenerative and exudative types because many fundi give a mixed picture, and considers that his recent demonstration that the incidence of these lesions increases dramatically with that of onchocerciasis in a community is a valid reply to Choyce (*Trans. R. Soc. trop. Med. Hyg.*, 1958, **52**, 500). Further surveys to show that onchocerciasis is an important blinding disease are to be deprecated if given priority over investigations into control methods. R. T. Leiper

1653—CAMPO JESÚS, L. DEL, 1957. "Medicina legal de la triquinosis." *Clínica y Laboratorio*, **64** (380), 341–349.

After pointing out that there has been a general increase in the incidence of trichinellosis in all countries, the author reviews the problems connected with legal medicine regarding this infection; amongst these is the difficulty of clinical and immunological diagnosis.

N. Jones

1654—CLOETENS, W., DE MEY, D., MAHIEUX, A. & SOLOMENTSEV, D., 1959. "Cardiopathie filarienne." *Annales de la Société Belge de Médecine Tropicale*, **39** (6), 799–816. [English, German, Spanish and Flemish summaries p. 815.]

A 28-year-old white man who had lived in the Belgian Congo for six years developed an obscure heart condition which got worse by stages and corresponded with an increased white cell and eosinophil count. The inguinal glands were enlarged. An onchocercal cyst was removed from the hip. The cardiopathy was considered to be due to filariasis so, in addition to the treatment usual for a heart condition, Carbilazine (a piperazine derivative) was also given. Treatment was successful. W. K. Dunscombe

1655—CONROY, J. V., 1957. [Nazareth Hospital, Philadelphia, Pennsylvania, U.S.A.] "The role of *Ascaris lumbricoides* in intestinal perforations." *American Journal of Surgery*, **94** (4), 542–545.

Basing his opinion on an analysis of the results of surgical exploration of cases with spontaneous intestinal perforations and also *Ascaris lumbricoides* infections, Conroy considers that it is always an enteric pathogen—*Salmonella paratyphi* in the cases studied—which is responsible for the primary perforation of the gut, the worms then using the existing perforation for escape into the peritoneum. Conroy was unable to show any relationship between the pre-operational presence of free intraperitoneal air and the roundworms, or between the worms and the size of the spleen on direct palpation at the time of surgery. G. I. Pozniak

1656—CORBO, S., 1957. "Il problema dell'enterobiasi nel bambino." *Archivio Italiano di Pediatria e Puericoltura*, **18** (2), 106–118. [English, French and German summaries pp. 116–117.]

Corbo, while discussing *Enterobius vermicularis* infection in children, refers to recent acquisitions in the field of diagnosis and therapy and discusses the life-cycle of the parasite and the prophylaxis of the disease. N. Jones

1657—FAUST, E. C., 1957. "Nematodos intestinales comunes de la infancia: epidemiologia, sintomatologia, tratamiento y prevencion." *Antioquia Médica. Medellín*, **7** (1), 21–32.

1658—FENGER, J. R., 1957. [Dhahran Medical Center, Dhahran, Saudi Arabia.] "Surgical complications of ascariasis." *Annals of Surgery*, **146** (6), 983–989.

Some of the common surgical complications of ascariasis, such as types of obstruction, fistula formation, etc. are discussed and are illustrated by four case histories. Emphasis is placed on the potential hazards due to coincidental *Ascaris* infections in the performance of otherwise routine surgical procedures and pre-operational stool examination of surgical cases in endemic areas is urged. G. I. Pozniak

1659—FRIEDHEIM, E. A. H. & DE JONGH, R. T., 1959. "L'effet du pentylthiarsaphénylmélatamine (Mel W) sur *W. bancrofti*." *Bulletin de la Société de Pathologie Exotique*, **52** (6), 785–791.

Pentylthiarsaphénylmélatamine is a trivalent water-soluble arsenical. Three patients living at Rosetta (Nile delta) with a mild *Wuchereria bancrofti* infection were given 0.1 gm. intramuscularly daily for four consecutive days; in two the treatment, with an increased dosage, was repeated after nine days. Two patients in Liberia with a heavier infection were given 0.2 gm. daily for three consecutive days. In all, treatment was given in hospital and was well tolerated but allergic manifestations developed four to seven days later. The drug seems to affect the adult worms, especially the females, but as there was a temporary inflammatory reaction locally there may be a risk of subsequent elephantiasis. W. K. Dunscombe

1660—GREENSTEIN, N. M. & STEINBERG, D., 1958. [1488 Metropolitan Avenue, Parkchester (62), U.S.A.] "The prompt and effective response of trichinosis to corticotropin." *Journal of Diseases of Children*, **95** (3), 261–269.

Three case histories of trichinelliasis in children treated with corticotropin (ACTH) are described. One (aged ten years) received a total dose of 1,080 units in six days, the second (aged six-and-a-half years with severe encephalopathy and myocarditis complications) received 1,540 units in 15 days and the third (aged five years) received 1,140 units in 13 days. The drug was administered intramuscularly in 80 units, later decreasing to 40 and 20 unit doses three times daily. A prompt and permanent removal of clinical symptoms was achieved. The use of large doses in a short course is recommended. G. I. Pozniak

1661—HERNÁNDEZ VALLADOS, R., 1958. "Algunos aspectos epidemiológicos de la uncinariasis en México." *Boletín Epidemiológico. Mexico*, **22** (1), 1–9.

After reviewing some aspects of hookworm infection in Mexico the author draws conclusions concerning the distribution, epidemiology and prophylaxis of the infection. N. Jones

1662—JORDAN, P., 1959. "The treatment of bancroftian elephantiasis and observations on hyaluronidase." *Journal of Tropical Medicine and Hygiene*, **62** (12), 286–289.

Jordan, from a review of medical, surgical and bandaging techniques concludes that, although bandaging the elephantoid limb gives the best result, there is no completely satisfactory technique at the present time for the treatment of bancroftian elephantiasis. P. Williams

1663—JORDAN, P., 1960. [East African Institute for Medical Research, Mwanza, Tanganyika.] "Effect of prednisolone in bancroftian elephantiasis." *British Medical Journal*, Year 1960, **1** (5178), 1020–1022.

Seven patients with tropical elephantiasis were treated twice daily with injections of 1 ml. (25 mg.) of prednisolone followed by 1 ml. daily in two doses for 25 days; the drug was then slowly withdrawn. Although there was a slight reduction in the limb measurements by the end of the treatment this is attributable to rest in bed and two to twelve months later the measurements were no less than before treatment. R. T. Leiper

1664—LARRIEU, 1957. "Mortalité et morbidité dues à l'ankylostomose dans trois agglomérations urbaines du cercle de Séguéla". *Bulletin Médical de l'Afrique Occidentale Française*, **2** (4), 411-416. [Discussion p. 415. English summary p. 416.]

Ancylostomiasis is prevalent in the northern part of the Ivory Coast, especially in the towns. 1,235 cases were registered in the district of Séguéla in 1955. Morbidity was observed in 25 cases in hospital, some of which proved fatal. In some pregnant women the infection led to premature birth and spontaneous abortion. Thymol, chenopodium oil and tetrachlorethylene were tested. Combined treatment with tetrachlorethylene and iron was found to be the most efficient. As prophylactic measures periodic treatment of infected persons, combined with limitation of the zones of defaecation and treatment of contaminated soils with chemical products, is proposed.

N. Jones

***1665**—LI, W. C. ET AL., 1959. [Ascariasis of the liver.] *Chinese Journal of Pathology*, **5** (4), 220-222. [In Chinese.]

***1666**—LI, S. L. ET AL., 1960. [Filariasis survey in Tsungchiang hsien, Kweichow Province.] *Chinese Journal of Internal Medicine*, **8** (3), 277-278. [In Chinese.]

1667—LIPPI, M. & D'ERCOLE, G., 1959. [Clinica de Enfermedades Tropicales y Subtropicales de la Universidad de Roma, Italy.] "Terapéutica de la ancylostomiasis con la asociación hexilresorcinol y tetracloretileno por instilación duodenal." *Revista Kuba de Medicina Tropical y Parasitología*, **15** (1/6), 19-22. [English, French, German and Italian summaries pp. 21-22.]

[This is a translation of a paper which appeared in *Arch. ital. Sci. med. trop.*, 1954, **35**, 489-494. For abstract see *Helm. Abs.*, **23**, No. 575b.]

1668—LO NIGRO, M., 1958. [Ospedale Civile "Vittorio Emanuele III", Matera, Italy.] "Primo caso di trichinosi in Lucania." *Giornale di Malattie Infettive e Parassitarie*, **10** (5), 414-416.

1669—MANN, L. S., EISEN, J. & FAMILARO, J. E., 1957. "Desmoid tumor of right internal oblique muscle in a patient with trichinosis." *Surgery. St. Louis*, **42** (2), 386-388.

1670—MARCH, H. N., LAIGRET, J., KESSEL, J. F. & BAMBRIDGE, B., 1960. [Institut de Recherche Médicale de la Polynésie Française, Papeete, Tahiti.] "Reduction in the prevalence of clinical filariasis in Tahiti following adoption of a control program." *American Journal of Tropical Medicine and Hygiene*, **9** (2), 180-184.

Data collected from males in Tahiti, ten years after the first survey in 1949 and five years after the start of a standard programme of vector control and mass treatment with a course of 12 monthly doses of 6 mg. per kg. body-weight of diethylcarbamazine, were compared for presence of clinical signs and symptoms and for microfilaraemia. No new case of elephantiasis or hydrocele developed in any person receiving the prescribed course and in 1959 no elephantiasis was found in the age groups up to 20 years. Comparison per cent with 1949 gave microfilaraemia 4 against 36, elephantiasis 2 against 7, and hydrocele 8 against 17.

W. K. Dunscombe

1671—MAVOR, H., 1958. [Division of Neurology, University of Vermont College of Medicine, Burlington, Vermont.] "Focal central-nervous-system involvement associated with trichinosis. Report of a case." *New England Journal of Medicine*, **258** (13), 648-650.

1672—McCARTHY, D. D., 1959. [Island Territories Research, Otago Medical School, Dunedin C.1., New Zealand.] "Filariasis in the Cook Islands." *New Zealand Medical Journal*, **58** (328), 738-748.

Filariasis is present on all of the islands in the Cook group. It is always more common in males than in females since the vector, *Aedes polynesiensis*, occurs mainly in the coconut plantations and has a short flight range. Where vector habitats occur in close proximity to human habitations the infection rate in females and children rises. The most heavily infected islands are Aitutaki and Atiu. In Rarotonga the incidence varies, being low in Avarua, the main settlement, and to the east but higher to the west of the island where most of the oranges and coconuts are grown. On the atolls generally, the incidence is lower because the soils are poorer, the undergrowth less abundant and the greater exposure to wind and

sun limits the amount of water available as breeding sites for the vector. There are, however, two exceptions, Pukapuka, which is heavily covered with coconut plantations and has always been more heavily infected than the other atolls, and Manihiki, where the incidence has increased in recent years with the immigration of more heavily infected individuals from the southern islands of the group.

L. K. Whitten

1673—McCARTHY, D. D., 1959. "The endemicity of filariasis in the Pacific Island Dependencies of New Zealand." *New Zealand Medical Journal*, **58** (328), 757-765.

A description is given of the "reservoir index" or "infective density index" by which the prevalence and intensity of filarial infection can be compared between different areas, between males and females or by which changes in endemicity over a period of time can be recorded. The index is the average number of microfilariae in 20 cu. mm. of peripheral blood in individuals in a standard population group, the latter being defined as group of 100 persons in which the various age groups are represented in the same proportions as they occur in the general population. The common age of onset of elephantiasis, which is also a measure of endemicity, is closely related to the reservoir index. In highly endemic areas the common age of onset is under 25 and the reservoir index is over 35, in moderately endemic areas the common age of onset is in 25-45 and the reservoir index is 15-35 and in areas of low endemicity the common age of onset is over 45 and the reservoir index is below 15. In the Cook Islands males are more heavily infected than females but the differences do not appear before the age of ten years. A measure of the amount of infection taking place in the domestic environment can be made by comparing the microfilarial incidence and infectivity indices of children in the 0-4 and 5-9 age groups.

L. K. Whitten

1674—MISRA, S. S., NATH, K., SHANKER, A. & PRAKASH, S., 1959. [King George's Medical College, Lucknow, India.] "Diethylcarbamazine (oral and parenteral therapy) in tropical pulmonary eosinophilia." *Journal of the Indian Medical Association*, **32** (6), 232-243.

Forty cases of tropical pulmonary eosinophilia were treated with diethylcarbamazine, 32 orally and 8 intramuscularly. For oral therapy 8 mg. per kg. body-weight was given daily and for parenteral therapy, four cases were given an initial dose of 800 mg. and four were given three to four injections of 400 mg. each at intervals of three to five days. The results of the oral therapy were 31 cured out of 32 (96.9%), the assessment of cure being the remission of the eosinophil count to below 800 per cu. mm. together with complete abatement of signs and symptoms of the disease and no relapse. The parenteral treatment resulted in a cure in one case only (in the 800 mg. group). In the remaining seven partial cure was obtained in some and complete cure resulted only after subsequent oral treatment with diethylcarbamazine or, in one case, after injection with mapharside. It is concluded from these trials that oral therapy with diethylcarbamazine is superior not only to parenteral therapy with this drug but also to treatment with arsenic injections.

J. J. C. Buckley

1675—MOREIRA, E., 1957. "Contribuição ao estudo do tratamento da ascarirose pela piperazina." *Jornal de Pediatria. Rio de Janeiro*, **22** (2), 78-84.

Moreira studied three regimes for the treatment of ascariasis with piperazine, using indifferently equivalent quantities of the hexahydrate, citrate and tartrate. The regimes were 50 mg., 100 mg. and 150 mg. per kg. body-weight for six, three and one day of treatment respectively. The second regime was found to be the most satisfactory. The drug was well tolerated, the only side effects observed being slight nervous and digestive disturbances.

J. M. Watson

1676—MORISHITA, K. & TANI, T., 1960. [Department of Parasitology, Research Institute for Microbial Diseases, Osaka University, Osaka, Japan.] "A case of *Capillaria* infection causing cutaneous creeping eruption in man." *Journal of Parasitology*, **46** (1), 79-83.

Two mature females of *Capillaria* causing typical cutaneous creeping eruption on a finger and ankle of a male Japanese from Osaka City are described. These worms have not previously been recorded from man; they closely resemble *C. cutanea* described by Swift, Boots & Miller (1922) from monkeys but differ from it in several characters. In the absence of males, however, the authors refrain at present from erecting a new species for these worms.

G. I. Pozniak

1677—NAGASE, N., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [Studies on pinworm disease. I. On the effective exterminating method of pinworm disease.] *Acta Scholae Medicinalis in Gifu*, 7 (2), 535–538. [In Japanese: English summary p. 535.]

Nagase administered piperazine hydrate every day for a week to 136 children and its effectiveness was studied by an anal swab examination 30 days after the end of treatment. 71 children proved negative, while the remaining 65 were found to have worm eggs in various stages of development. The effectiveness of White's method was assessed by thorough anal examination for one week, a fortnight after the end of treatment. Many positive cases were found.
Y. Yamao

1678—NASH, J., KIDNEY, J. G., FURNELL, M. J. & O'MEARA, P. B., 1957. [Regional Hospital, Limerick, Republic of Ireland.] "An outbreak of trichinosis in Ireland in 1956." *Journal of the Irish Medical Association*, 40 (237), 74–76.

Nash *et al.* present seven case reports of trichinelliasis in women in Tipperary. They confirmed the diagnosis in five cases by muscle biopsy. They record the symptomatology of these cases and briefly discuss treatment, pathology and prevention.
C. Hatch

1679—NINANE, G. & POFTE, F., 1959. [Laboratoire Médical Provincial, Stanleyville, Belgian Congo.] "Essai clinique de l'hydroxynaphtoate de béphénium dans l'ankylostomiase." *Annales de la Société Belge de Médecine Tropicale*, 39 (6), 887–892. [English, German, Spanish and Flemish summaries pp. 889–890.]

One dose of bephenium hydroxynaphthoate was given to 25 Congolese children aged one to eight years; one dose of 10 gm. of the drug was given to 25 adult male Congolese all of whom were suffering from proved ancylostomiasis. In the first group ten were cured, the number of eggs in the faeces was greatly reduced in nine, and even in the six failures the number of eggs was on the average much lower than before treatment. Side effects (immediate vomiting and diarrhoea for one day) occurred in four patients. In the second group, thirteen were cured, the number of ova was greatly reduced in eight and five showed no improvement. Side effects (diarrhoea) occurred in five patients. For mass treatment the most effective dosage is 2.5 gm. bephenium base.
W. K. Dunscombe

1680—OATES, J. K., 1958. "A case of filariasis with chyluria." *British Journal of Venereal Diseases*, 34 (2), 122–123.

1681—OGINO, Y. & ABE, H., 1959. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [On the mass treatment of pinworm infection with piperazine.] *Japanese Journal of Parasitology*, 8 (4), 515–517. [In Japanese: English summary p. 517.]

In a rural district of Saitama Prefecture, the infection rate of pinworms among children was 44.6%. Piperazine was proved effective.
Y. Yamao

1682—ORREGO M., A., LONDOÑO S., J. & BOTERO R., D., 1959. [Universidad de Antioquia, Colombia.] "Tratamiento de la tricocéfaliasis con enemas de hexylresorcinol." *Revista Kuba de Medicina Tropical y Parasitología*, 15 (1/6), 2–4. [English summary p. 4.]

40 children, aged between five months and eleven years, who had been or were being treated with hexylresorcinol orally were given enema containing 0.3% of the drug, oral treatment being suspended. The number of enemata varied between three and six on alternate days. 30 patients were cured, and in the remainder the number of eggs in the faeces was reduced by more than 90%. The drug was well tolerated and side effects only occurred in four patients. The enemata were retained for more than one hour.
W. K. Dunscombe

1683—OSIMANI, J. J., 1957. "El síndrome 'larva migrans visceral' como causa de eosinofilias elevadas y persistentes en pediatría." *Archivos de Pediatría del Uruguay*, 28 (8), 558–563. [English summary p. 563.]

Osimani, in his discussion of the visceral larva migrans syndrome, caused by *Toxocara canis* and *T. cati* infections, stresses the importance of differentiating between this syndrome and that caused by migrating larvae of *Ascaris lumbricoides*.
N. Jones

1684—PACHECO SANCHEZ, S. & RUIZ REYES, F., 1957. "Analgésico de síntesis como auxiliar en el tratamiento médico de la oncocercosis." *Boletín Epidemiológico. Mexico*, **21** (2), 48–49.

Following the administration of diethylcarbamazine against onchocerciasis 85 persons were given 2 gm. of Magnopyrol intravenously followed by two to six tablets (500 mg. each) per day for two or three consecutive days. Anaphylactic reactions due to the treatment with diethylcarbamazine were thus considerably reduced. The anthelmintic efficacy of diethylcarbamazine was not lost through the use of Magnopyrol. N. Jones

1685—PALI, E. T., 1960. [2-ya akushersko-ginekologicheskaya klinika i kafedra epidemiologii, Azerbaidzhanski meditsinski Institut imeni N. Narimanova, U.S.S.R.] [The influence of helminthiasis (ancylostomiasis) on the course and outcome of pregnancy.] *Sovetskaya Meditsina*, **24** (3), 94–98. [In Russian.]

Pali has observed the influence of ancylostomiasis on the course and outcome of pregnancy in the case of 55 women; other intestinal infections, including *Ascaris* and *Trichuris*, and malaria (mainly as a past history) were also present in a great proportion of the patients. It was found that while ascariasis was not without effect, trichuriasis could lead to a series of complications. The patients were treated, either before or after childbirth and after supportive measures, with carbon tetrachloride. The author goes on to mention some previous experiments in which it was found that (i) emulsions of ancylostomes, ascarids and *Taenia saginata* intensified the contractions of the uterus (cats and rabbits), (ii) a pregnant uterus was more sensitive to these emulsions, especially to that of *Ancylostoma*; and (iii) the tonus of the smooth muscles increased as the quantity of emulsion increased. [For a fuller account of these experiments see *Akush. Ginek.* 1958, **34**, 21–25.] N. Jones

1686—PAREKH, J. G. & KULKARNI, D. R., 1958. [J. J. Group of Hospitals, Bombay-8, India.] "A clinical and therapeutic study in dracontiasis (guineaworm) infection." *Journal of the J. J. Group of Hospitals and Grant Medical College. Bombay*, **3** (1), 22–39.

A brief consideration of the occurrence of dracontiasis and the difficulty of its prevention in India is followed by a description of the life-cycle of the worm and the clinical symptoms and complications of the infection. A number of drugs reputed to possess a therapeutic effect against guinea-worm (fresh aerial roots of *Ficus bengalensis*, their powdered form known as Draculan, D.C.N.—a grass constituent plus ammonium chloride and iodine, a similar preparation named Genoid, Calmist—containing camphor, asafoetida and lime, powdered portions of peacock feathers, hetrazan and various locally applied substances including novocain injections) were tried on 730 patients, but none proved to be therapeutically active, or palliatively effective, being similar in effect to an inert placebo given as control.

G. I. Pozniak

1687—PARIKH, C. C., 1958. [Pethapur Dispensary, Pethapur District Masana, India.] "Observations on ankylostomiasis in general practice." *Indian Journal of Medical Sciences*, **12** (7), 545–547.

Parikh draws attention to the high incidence of ancylostomiasis at a dispensary practise in the Baroda District. The combination of symptoms which should lead practitioners to suspect hookworms are pain in the epigastric region which increases after food, black spots on the tongue and anaemia. A therapeutic test with tetrachlorethylene, reducing symptoms, aids the diagnosis. A survey made at one village revealed ancylostomiasis in 52 of 85 persons examined by single stool examination.

G. I. Pozniak

1688—POGGI, I. & BONETTI, F., 1957. "L'infestazione da *Ancylostoma duodenale* nel Comune di Brescia. Considerazioni epidemiologiche dedotte da 15 anni di osservazione." *Giornale di Malattie Infettive e Parassitarie*, **9** (12), 1078–1084.

The incidence of ancylostomiasis in the Commune of Brescia has markedly decreased from 20% of those examined in 1940 to 9% in 1955. The familial nature of the infection has become less evident but the occupational nature has remained, ancylostomiasis occurring almost exclusively amongst market gardeners. Treatment with 10% chloroform in castor oil (Alessandrini's method) proved to be more efficient than with tetrachlorethylene. N. Jones

- 1689**—SAMESHIMA, H. & SATO, T., 1958. [Department of Urology, Kurume University School of Medicine, Kurume-shi, Japan.] "A case of wuchereriosis on the spermatic cord." **Kurume Medical Journal**, 5 (2), 87-92.

The case history is described of a 22-year-old student originating from Okinawa, whose complaint was intrascrotal induration subsequent to a kick received in the scrotal region. On operation for suspected tumour of the spermatic cord, filariae of *Wuchereria bancrofti* were found in the cystic dilatation of a lymph vessel. The authors discuss the diagnosis of *Wuchereria* infections of the spermatic cord taking into consideration various cases reported in Japanese literature.

G. I. Pozniak

- 1690**—SASA, M., ET AL. 1957. [Department of Parasitology, Institute for Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Field studies on the control of Malayan filariasis and its vector mosquitoes in Hachijo-Koshima Island.] **Japanese Journal of Sanitary Zoology**, 8 (1), 5-10. [In Japanese: English summary pp. 9-10.]

22 of 66 residents of Hachijo-Koshima Island were found to have microfilariae of *Wuchereria malayi* in August, 1956. 6 mg. per kg. body-weight of supatoin (diethyl carbamazine compound) was given for more than ten days to all the carriers. D.D.T. residual spray was applied to the houses at 2 gm. of D.D.T. to one square meter of wall. *Oryzias latipes*, a species of fresh-water fish, was set free in concrete rain-water reservoirs. Miscellaneous water containers scattered in the village were treated by suspensions of D.D.T. paste. Rock pools along the seashore were dusted with D.D.T. by helicopter, a total of 180 kg. of 10% D.D.T. powder being applied to an area of about 80,000 square meters. The island was again surveyed in December of the same year. Radical control of the parasites and vectors had not been attained. Most necessary were the repeated applications of such control measures. Y. Yamao

- 1691**—SCOTT, D., 1960. [Medical Field Units, Ghana.] "An epidemiological note on guinea-worm infection in north-west Ashanti, Ghana." **Annals of Tropical Medicine and Parasitology**, 54 (1), 32-43.

A six-year investigation of dracontiasis in a rural area of Ashanti with a population of about 4,000, showed that the people depending on shallow ponds for their water supplies had a high infection rate which was greatest in the dry season. In the highly endemic areas over 50% of persons over 10 years old were infected. About 25% appear to be able to resist infection completely, possibly owing to the high hydrochloric acid content of the gastric juice, as shown two hours after a fractional meal test.

W. K. Dunscombe

- 1692**—SEMAGO, M. I., 1960. [Oxygen treatment of ascariasis and trichuriasis.] **Klinicheskaya Meditsina. Moscow**, 38 (3), 129-130. [In Russian.]

Semago describes a method of oxygen treatment of ascariasis and trichuriasis, the merit of which is that the small and large intestines are both filled with oxygen. The former is filled through the stomach by a duodenal tube and the other through the rectum. The author used this method in the case of 268 persons. After one month faecal analyses were negative in 95% of the cases. The only side effects observed were exacerbation of chronic appendicitis in one patient and changes in the menstrual cycle in five others.

N. Jones

- 1693**—SHINKADO, O., 1959. [Department of Parasitology, Faculty of Medicine, Kagoshima University, Kagoshima, Japan.] [Studies on ancylostomiasis in southern Kyushu. Studies on hookworm infection in rural districts.] **Medical Journal of Kagoshima University**, 11 (1), 351-367. [In Japanese: English summary p.351.]

In the Hatsuda area, the southern part of Miyazaki Prefecture, the infection rate with ancylostomiasis amongst the inhabitants was 53.5%. The species involved were *Ancylostoma duodenale* and *Necator americanus* and the infection ratio was 1 to 1.9, but the ratio of parasite numbers of the two species was 1 to 7.1. The infection rate and worm burden with *A. duodenale* were highest amongst the inhabitants not involved in field work but both rates in *N. americanus* infections were higher among field workers. The difference could be explained by the different modes of infection of the two species, i.e. *A. duodenale* infection was acquired through the mouth with the food and *N. americanus* through the skin. In a survey of hookworm larvae in soil the distribution of the two species was found to be non-specific. The larval activity in

the ground and on leaves seemed to be affected by ground conditions, humidity, temperature and, especially, by the geological characteristics of the sandy ground in southern Kyushu.

Y. Yamao

1694—SILVA, R. DA, 1957. "Larva migrans visceralis. Um novo problema de importância em pediatria e em saúde pública." *Jornal de Pediatria. Rio de Janeiro*, **22** (1), 11–20.
da Silva briefly reviews the present status of knowledge in respect of visceral larva migrans.

J. M. Watson

1695—SQUADRINI, F., ALBERTI, M. & TAPARELLI, F., 1957. [Clinica delle Malattie Infettive e Tropicali, Università di Modena.] "L'infestazione da *Strongyloides stercoralis*. Contributo personale e considerazioni statistiche, cliniche, diagnostiche e terapeutiche." *Bollettino della Società Medico-Chirurgica di Modena*, **57** (5 bis), 799–816.

Four persons infected with *Strongyloides stercoralis* received combined treatment with acridine derivatives, tetrachlorethylene and chenopodium oil. The results of the treatment were studied by at least three monthly post-treatment faecal examinations. Cure was complete in two cases. In one of the other two cases (a seven-year-old girl) eggs of *Trichuris trichiura* were also found in the faeces. The faeces of this patient remained positive after the treatment but there was a marked reduction in the number of *S. stercoralis* larvae and an improvement in the general condition. The general condition also improved in the fourth patient although the faeces remained positive. The authors discuss the pathogenic, diagnostic and therapeutic aspects of *S. stercoralis* infection.

N. Jones

1696—STEGAWSKI, T., 1958. "Przypadek włośnicy ze stwierdzonymi biopsyjnie dojrzałymi włośniami mięśniowymi w 11 dniu choroby." *Polski Tygodnik Lekarski*, **13** (19), 723–725. [English and Russian summaries p. 725.]

Stegawski describes a case of trichinellosis diagnosed by muscle biopsy 11 days after the appearance of symptoms. The larvae found indicated that infection had occurred 21 to 28 days previously. This confirms that the incubation period (lasting 10 to 17 days) was longer than is usually accepted and that the reaction of the host was not directly caused by the intestinal and migrating phases or even the entry of larvae into the muscles. Periodically repeated blood tests in a number of trichinellosis patients were always negative, showing that the passage of larvae through the blood is rapid and that this stage would therefore be more suitably called the dissemination of, rather than the migration of, larvae.

G. I. Pozniak

1697—THANNISCH, G., 1958. "Multiple hepatic abscesses due to *Ascaris lumbricoides*. Case report." *Journal of Pediatrics*, **53** (5), 602–607.

1698—TORROELLA, J. & LAGRAULET, J., 1957. "La zona oncocercosa de Tiltepec, Oaxaca (Estudio oftalmológico)." *Boletín Epidemiológico. Mexico*, **21** (4), 105–106.

Onchocerciasis was found in 96% of 143 persons examined in three villages in the region of Oaxaca (Mexico) with a high incidence of this infection. The average incidence of ocular lesions was 25%. Acute lesions and blindness were rare. As a result of studies by one of the authors (Lagraulet) in Africa, it is concluded that ocular lesions are less serious in America than they are in Africa, and that lesions of the posterior chamber of the eye resemble exactly such lesions due to onchocerciasis in Africa but are fewer in number.

N. Jones

***1699**—WU, C. L., LIU, E. H. & FU, H. C., 1957. [Epidemiological survey of filariasis bancrofti in South Shantung, China.] *Acta Microbiologica Sinica*, **5** (3), 242–255. [In Chinese: English summary.]

Wu *et al.* report that the infection rate with *Wuchereria bancrofti* in three villages in South Shantung averaged 23.78%. *Culex pipiens pallens*, *C. tritaeniorhynchus* and *Anopheles hyrcanus sinensis* were all common in the area, the first-named being most numerous in houses. Detection of infected mosquitoes by dissection and laboratory experiments led the authors to conclude that *C. p. pallens* is the most important natural vector of bancroftian filariasis in this area. [Based on an abstract in *Chin. med. J. Peking*, **75**, 957.]

J. M. Watson

- 1700**—ŻOŁNIERKOWA, D., 1959. [Wojewódzka Stacja Sanitarno-Epidemiologiczna, Wrocław, Poland.] "Epidemiologiczne opracowanie ogniska włośnicy w pow. Kłodzko w r. 1959." **Wiadomości Parazytologiczne**, **5** (6), 577–583. [English summary p. 583.]
 Żolnierkowa reports on an outbreak of trichinellosis in the Kłodzko district in early 1959. 378 cases were diagnosed and 70 cases suspected. The source of the epidemic was traced to sausages.
 N. Jones

Nematomorpha

No relevant abstracts in this issue

Hirudinea

- 1701**—GONZÁLEZ DE VEGA, N., GÓMEZ-MORENO, C. & RODRÍGUEZ AGUILAR, M., 1960. [Dispensario Antituberculoso y de Enfermedades del Tórax, Granada, Spain.] "Un caso de condensaciones pulmonares originadas por una sanguijuela." **Revista Ibérica de Parasitología**, **20** (1), 31–37. [English summary p. 37.]
 A man in Spain was suffering from infiltration of the lung that was traced to a leech which had invaded the trachea and large bronchi.
 M. McKenzie

Pentastomida

- 1702**—BOUCKAERT, L. & FAIN, A., 1959. "Een geval van nymphale porocephalose met dodelijk verloop." **Annales de la Société Belge de Médecine Tropicale**, **39** (6), 793–797. [English, French, German and Spanish summaries p. 796.]
 At operation on a 35-year-old African male, complete obstruction of the colon at the hepatic angle was found with dense adhesions to the liver. The omentum was invaded by massive numbers of nymphs of *Armillifer armillatus*, which were regarded as being the original cause. The patient died 15 days later.
 W. K. Dunscombe

Miscellaneous

See also Nos.: 2035, 2036, 2037, 2046, 2051, 2052, 2167, 2283, 2315.

- 1703**—CHANG, S. L., BERG, G., CLARKE, N. A. & KABLER, P. W., 1960. [Robert A. Taft Sanitary Engineering Center, Bureau of State Services, Public Health Service, U.S. Department of Health, Education and Welfare, Cincinnati, Ohio, U.S.A.] "Survival, and protection against chlorination, of human enteric pathogens in free-living nematodes isolated from water supplies." **American Journal of Tropical Medicine and Hygiene**, **9** (2), 136–142.
 Free-living nematodes *Diplogaster nudicapitatus* and *Cheilobus quadrilabiatatus*, found in a city water supply, were fed with *Salmonella typhosa*, *S. paratyphi*, *S. typhimurium*, *Shigella sonnei* and *Sh. dysenteriae* II. In addition a suspension containing both adults and larvae of the two worms was fed Cocksackie A9 and the HEV strain of ECHO 7 enteric viruses, the suspension being exposed to varying concentrations of chlorine for varying periods. The worms were not killed at concentrations of 2.5 to 3.0 p.p.m. chlorine but with high chlorine and longer contact time mortality rose. The pathogens survived in the gut for some time after the carrier worms had been killed and resistance to chlorine in descending order was: sheathed larvae, adults, non-sheathed larvae. The authors suggest that nematodes of the family Rhabditidae and of sewage treatment origin may be potential carriers of pathogens.
 W. K. Dunscombe

- 1704**—CORBO, S. & RICCI, M., 1957. "Accrescimento infantile e parassitismo intestinale." **Archivio Italiano di Pediatria e Puericoltura**, **18** (4), 263–267. [English, French and German summaries p. 267.]
 [This paper also appears in **R. C. Ist. Sanit. pubbl.**, 1958, **21**, 120–125. For abstract see **Helm. Abs.**, **27**, No. 151a.]

- 1705**—FÜLÖP, T. & KONDOR, L., 1958. "Kísérlet egy falu helmintózisban szenvedő lakosainak dehelmintizálására." [Attempt on the eradication of helminths in the inhabitants of a village suffering from helminthiasis.] *Népegészségügy. Budapest*, **39** (5/6), 145–147. [German & Russian summaries p. 158.]
- 1706**—NATH, K. & PANDEYA, S. N., 1960. [Department of Medicine, King George's Medical College, Lucknow University, Lucknow, India.] "Diethylcarbamazine therapy in tropical eosinophilia." *British Medical Journal*, Year 1960, **1** (5166), 104–107.
40 out of 44 cases of tropical eosinophilia obtained either complete or partial relief after treatment for four days with hetrazan in daily doses of 8 mg. per kg. body-weight, and 40 of the cases were cured in two weeks. The four resistant cases responded later to oxophenarsine injections. R. T. Leiper
- 1707**—NEGhme, R. A., 1958. [Escuela de Medicina, Universidad de Chile.] "Metodología de la educación médica. I. Doce años de experiencia en la enseñanza de la parasitología." *Revista del Servicio Nacional de Salud. Santiago*, **3** (3/4), 331–350.
The parasitological section of the Medical School of the University of Chile has made changes in the curriculum to help to develop the initiative of students. The changes have included introducing field work among infected patients and communities, and stimulating discussions during practical lessons between the demonstrator and five or six students. M. McKenzie
- 1708**—PAREKH, J. G., KULKARNI, V. B. & PATEL, B., 1958. [J. J. Group of Hospitals, Bombay-8, India.] "Diethylcarbamazine in tropical eosinophilia." *Journal of the J. J. Group of Hospitals and Grant Medical College. Bombay*, **3** (4), 271–280.
For the treatment of tropical eosinophilia in 92 out-patients, diethylcarbamazine was administered either orally as tablets or syrup in doses of 450 mg. (in three portions) daily for three to seven days, or injected intramuscularly in doses of 1 ml. (400 mg.) on two consecutive days. In 64 cases complete relief of symptoms accompanied by normal eosinophil counts were obtained and in 12 cases a fair response was achieved. Five cases, in which there was a recurrence, were satisfactorily treated by arsenic or a third injection of diethylcarbamazine. The treatment was, on the whole, well tolerated and the response was usually seen after four to seven days. G. I. Pozniak
- 1709**—POBLETE, L. S., 1958. [Universidad de Chile.] "El consultorio externo de enfermedades parasitarias y su acción extramural." *Revista del Servicio Nacional de Salud. Santiago*, **3** (3/4), 353–370.
Poblete observed and now describes the function of the Outpatient Clinic for Parasitic Diseases in Chile. Information on the epidemiology and prophylaxis of parasitic infections is made available to the patients through posters in the clinic and during the interviews with the doctor. Popular beliefs among patients included the idea that taeniasis was picked up through sexual relations, and ascariasis through eating too many sweetmeats as a child. Poblete interviewed at home the families of three patients and records details of their home backgrounds and helminth infections, which were taeniasis and enterobiasis. He observes that the work described in this paper did not give him, as a medical student, sufficient contact with the families of patients nor with the techniques of prophylactic education. M. McKenzie
- 1710**—ROSTOMBEKOVA, N. V., 1957. [Tbilisski gosudarstvenni Institut, Tbilisi, U.S.S.R.] [The significance of water and vegetables in the distribution of helminthiasis.] *Soobshcheniya Akademii Nauk Gruzinskoi SSR.*, **18** (4), 467–472. [In Russian.]
In the Kaspi area of the Georgian S.S.R., the helminth egg contamination of drinking water was insignificant (0.03 eggs per litre), of the river Lekhuri it was 2 eggs per litre, of irrigation canals (river water) 3.8 eggs per litre, of garden produce 3.2 eggs per kg. and, when marketed after washing, 2.6 eggs per kg. G. I. Pozniak
- 1711**—SHANKER, A., BHARGAVA, R. K. & SHRIVASTAVA, B. N., 1960. [Gandhi Medical College, Bhopal, India.] "Diethylcarbamazine in tropical pulmonary eosinophilia." *British Medical Journal*, Year 1960, **1** (5166), 100–103.
58 cases with characteristic symptoms of pulmonary eosinophilia, an absolute eosinophil count of 4,000 per cu. mm. or more and no clinical or laboratory evidence of parasitic infection,

were treated with diethylcarbamazine. In 50 cases only one oral dose of 8 mg. per kg. body-weight gave quick symptomatic relief and a cure rate of 97%; in three the eosinophil count rapidly returned to normal. Parenteral treatment failed in seven out of eight cases but six later responded to oral treatment and one was cured by arsenic. R. T. Leiper

1712—SHOOKHOFF, H. B., 1957. [School of Public Health and Administrative Medicine of the Faculty of Medicine, Columbia University, N.Y., U.S.A.] "Clinical aspects of parasitic infections of the gastrointestinal tract." **American Journal of Gastroenterology**, **27** (6), 549–555. [Discussion pp. 555–556.]

In this lecture, presented before the course in post-graduate gastroenterology of the American College of Gastroenterology, Shookhoff discussed *inter alia* the place of quinacrine in the treatment of tapeworm infection and the diagnosis and treatment of *Schistosoma mansoni* infection. J. M. Watson

1713—TORO, A. S., 1958. [Escuela de Medicina de la Universidad de Chile.] "Funcionamiento del 'consultorio externo de enfermedades parasitarias' y estudio comparativo con los consultorios externos de los hospitales 'San Luis' y 'Salvador'." **Revista del Servicio Nacional de Salud, Santiago**, **3** (3/4), 370–383.

Toro gives the case reports of two patients, one with infection of *Enterobius* and the other, a girl of five years of age, with *Taenia saginata* infection. He visited their homes and records details of their family and home backgrounds. The girl was treated unsuccessfully with (i) santonin, (ii) 0.50 gm. of acranil and a saline purge and (iii) a drink made from pumpkin seeds, but parasitological examination sometime later was negative for *Taenia* infection. The Outpatient Clinic for Parasitic Diseases in Chile instructs patients on the prevention of infections and in this sense the author found it compared favourably with two other outpatient clinics in Santiago. M. McKenzie

VETERINARY HELMINTHOLOGY

Horses, Donkeys and Mules

See also Nos.: 1736, 2058, 2119.

1714—SELLA, A., 1959. "Il dosaggio della fenotiazina nella lotta contro la strongilosi equina." **Clinica Veterinaria, Milan**, **82** (6), 199–202. [English summary p. 202.]

Sella treated two groups of horses and mules, each of eight animals, with phenothiazine against strongylosis. The first group was treated for seven months with 40 gm. of the drug, administered *per os* every 40 days. The second group received seven consecutive courses of treatment, each of 20 days followed by a 10-day interval, with a daily dose of 2.5 gm. of the drug. The average egg count per gramme of faeces after treatment was 13.7 in the first group and 2.5 in the second; whereas larvae hatched from eggs in the faeces of six animals in the first group, no eggs obtained from animals in the second group were viable. The authors conclude that small daily doses of phenothiazine are more effective than massive doses at longer intervals. N. Jones

1715—TRETAKOVA, O. N., 1960. [Thelaziasis in horses.] [Abstract.] **Veterinariya**, **37** (4), 58. [In Russian.]

Cattle

See also Nos.: 1592, 2025, 2038, 2044, 2074, 2080, 2156, 2159, 2183, 2187, 2201, 2230, 2265, 2266, 2274, 2276, 2287, 2289, 2290, 2291, 2303, 2304, 2312, 2315, 2328.

1716—ALWAR, V. S., 1959. [Madras Veterinary College, Madras, India.] "Intensive treatment of nasal schistosomiasis in cattle. A preliminary report." **Indian Veterinary Journal**, **36** (2), 56–65. Intensive two-day treatment with intravenous antimony sodium tartrate was given to bullocks infected with *Schistosoma nasalis*. Of seven bullocks given a total dose of six grains per 100 lb.

body-weight as six injections over two days, five were cured and two relapsed; of two bullocks given the same total dose but in four injections over two days, one was cured; of two bullocks given seven grains per 100 lb. body-weight as six injections over two days, one was cured; two bullocks given five grains per 100 lb. body-weight as injections over two days were not completely cured; toxic reactions were observed in bullocks given eight and nine grains per 100 lb. body-weight in six injections, two animals died and the remainder were cured.

O. D. Standen

1717—ANON., 1957. "Parasitic gastro-enteritis—roundworm infestation of cattle." **Rural Research in C.S.I.R.O. Melbourne**, No. 22, pp. 12–16.

Nematode infections in Australian cattle are briefly discussed in the paper. *Haemonchus placei*, *Cooperia punctata*, *C. pectinata*, *Bunostomum phlebotomum* and *Oesophagostomum radiatum* are considered important in northern summer-rainfall areas, and *Ostertagia* spp., *Trichostrongylus axei* and *Cooperia oncophora* in southern winter-rainfall areas. Research, treatment and prophylaxis are discussed.

N. Jones

1718—BALABEKYAN, T. P., 1960. [Neoascariasis of cattle.] **Veterinariya**, 37 (2), 27–28. [In Russian.]

Neoascariasis was found in calves on 19 out of 27 co-operative farms in the Azerbaidzhan Republic. The incidence was greatest among one to two-month-old animals and less among three to four-month-old animals; older calves were not infected. The incidence of infection was 24.9% in the mountains, 17.5% in the foothills and 0.09% in the lowlands. Results of treatment of 379 calves showed that piperazine adipate, at a dose of 0.5 gm. per kg. body-weight, had 100% efficacy while sodium sulphate, at a concentration of 10%, had 91.7% efficacy. The other drugs tested, namely, santonin, hexachlorethane and phenothiazine, showed less satisfactory results.

N. Jones

1719—BORAY, J. C., 1959. [McMaster Animal Health Laboratory, C.S.I.R.O., Parramatta Road, Glebe, N.S.W., Australia.] "Studies on intestinal amphistomosis in cattle." **Australian Veterinary Journal**, 35 (6), 282–287.

Boray summarizes the geographical distribution of outbreaks of intestinal paramphistomiasis in ruminants and describes an outbreak on a state farm in Hungary. Of 29 cattle two years of age nine had to be slaughtered *in extremis*. The clinical symptoms, post-mortem findings, pathogenesis, epidemiology, diagnosis and treatment are described. It is, however, concluded that the presence of immature flukes in the faeces is the only practicable means of ante-mortem diagnosis and that there is no anthelmintic at present which is effective against the pathogenic immature stages.

S. Willmott

1720—BORCHERT, A., 1959. [Institut für Veterinärmedizinische Parasitologie, Humboldt-Universität, Berlin.] "Parasitologische Erfordernisse bei der Offenstall-Haltung." **Monatshefte für Veterinär Medizin**, 14 (6), 170–172.

Borchert points out the hygienic conditions and prophylactic measures required for the parasite-free maintenance of cattle in open stalls.

G. I. Pozniak

1721—BUROV, G. A., 1960. [Cowshed and enclosed pasture maintenance of cattle as a method of prevention of fascioliasis.] [Abstract.] **Veterinariya**, 37 (4), 55–56. [In Russian.]

1722—DORSMAN, W., 1959. [State Serum Institute, Rotterdam, Netherlands.] "A new treatment of cattle against liver flukes (*Fasciola hepatica*)."
International Veterinary Congress (16th), Madrid, May 21–27, 1959. Vol. II, pp. 609–610.

Dorsman summarizes some data on the use of hexachlorophene against *Fasciola hepatica* [see also Helm. Abs., 28, No. 67b].

N. Jones

1723—GEVEDZE, 1960. [Concomitant infections of *Paramphistomum* and *Fasciola* in young cattle.] [Abstract.] **Veterinariya**, 37 (4), 56. [In Russian.]

1724—HOFSTRA, K., 1959. "Cysticercose en vleeskeuring. II." *Tijdschrift voor Diergeneeskunde*, **84** (10), 538-547, 549. [English, French & German summaries pp. 546-547. Discussion p. 548.]

Hofstra discusses the various ways in which it might be possible to reduce the incidence of cysticerciasis in cattle in the Netherlands. Among the measures discussed are, a campaign against consumption of insufficiently cooked meat; deep freezing of beef; more exhaustive meat inspection, not restricted to the usual predilection sites; the adoption of methods current in the U.S.A., and in Denmark.

A. E. Fountain

1725—KEULEN, A. VAN, 1959. "Epidemiology of cysticercosis bovis." *International Veterinary Congress (16th), Madrid*, May 21-27, 1959. Vol. II, pp. 753-754.

On the basis of investigations of *Cysticercus bovis* infection on 458 farms, the author concludes that it is due to various types of *Taenia* carriers. In 9% of the cases carriers could be traced to people living on the farms, visitors, fishermen etc. The author goes on to discuss the economic losses in correlation with the incidence of this infection.

N. Jones

1726—KOVÁCS, F., 1959. "Die intramuskuläre Behandlung der Rinderfasziolose mit Tetrachlorkohlenstoff." *International Veterinary Congress (16th), Madrid*, May 21-27, 1959. Vol. II, pp. 605-607.

Kovács has worked out a cheap and quick method for the administration of carbon tetrachloride against *Fasciola hepatica* in cattle. A mixture of carbon tetrachloride with an equal amount of paraffin and 0.5 gm. of 1% Lidocaine (diethyl amino-2-6-dimethyl-acetanilide hydrochloride) was injected intramuscularly in two or three places on the side of the neck. The dose was 8 ml. per 100 kg. body-weight, with a maximum of 40 ml. per animal. 75% to 90% of the cattle were cured. The drug was generally well tolerated and side effects were transient, but some older animals and those on a carbohydrate-poor diet required special attention.

G. I. Pozniak

1727—LANGELER, J. E. T., 1959. "Moderne longwormtherapie." *Tijdschrift voor Diergeneeskunde*, **84** (12), 650-656. [English, French & German summaries pp. 655-656.]

Langer reports on his experiments on the treatment of lungworm disease in calves. Aerosol treatment (ascaridol and santonin for periods varying between 8 and 30 minutes) was effective: 12 calves were treated in this way and all were free from infection five days later (in six cases a second treatment had had to be given because of faulty technique). On the other hand, Dictyocide (cyanacethydrazide), given in the recommended dosage of 3 ml. per 50 kg. body-weight on three successive days, was effective in only 3 out of 24 animals in one series and in 4 out of 14 in a second. The aerosol treatment worked out at 6.70 fl. (about 13s. 6d.) per animal; Dictyocide cost 4.35 fl. per animal (about 8s. 9d.). Aerosol therapy is clearly the better of the two and if drugs cheaper than santonin and ascaridol, but equally effective, could be found for this treatment the economic needs would be met as well.

A. E. Fountain

1728—LEE, R. P., ROSS, J. G. & ARMOUR, J., 1959. [Federal Department of Veterinary Research, Vom, P.O. Bukuru, N. Nigeria.] "Field investigations into parasitic gastro-enteritis and poor post-weaning weight gains in Nigerian zebu cattle." *Bulletin of Epizootic Diseases of Africa*, **7** (4), 349-354. [French summary pp. 353-354.]

Lee *et al.* used groups of 10 to 11 calves in two series of experiments giving various treatments, to show the effects of phenothiazine, mineral, protein and carbohydrate supplements, and recorded weekly weight gains and regular individual packed cell volumes, haemoglobin and red cell and faecal egg counts and prepared pooled cultures of faeces for larval differentiation. In their second series they also estimated serum calcium and other blood constituents [see also Helm. Abs., **28**, No. 72b]. It was shown that in Northern Nigeria the low protein content of herbage during the rains and haemonchiasis are the chief causes of poor post-weaning weight gains and anaemia of zebu calves.

G. Froyd

1729—MAYHEW, R. L., 1959. [Department of Veterinary Science, Louisiana State University, Louisiana, U.S.A.] "Studies on bovine gastrointestinal parasites. XXII Rate of consumption of phenothiazine in salt-phenothiazine mixtures by cattle." *American Journal of Veterinary Research*, **20** (76), 498-504.

The consumption of phenothiazine via a 10:1 salt and phenothiazine mixture provided on pasture or in stall was estimated in a group of 36 uninfected dairy-type cattle. Ingestion

of the drug was on the basis of "free-choice". The experiment was carried on over a period of 21 months. When salt only was provided more was consumed in general than when the mixture only was available; wide variation in individual consumption was also apparent; administration with molasses did not increase consumption materially. It was determined that the amount of the mixture consumed was often less than that necessary to supply the amount of phenothiazine required to control development of larval helminths and that provision of a salt and phenothiazine mixture is not a reliable method for control of helminthic infections.

O. D. Standen

1730—MOZGOVOI, A. A. & BISHAEVA, L. K., 1960. [A case of an unusual intensity of hydatid infection in a cow.] [Abstract.] *Veterinariya*, **37** (4), 57. [In Russian.]

1731—PANCHENKO, 1960. [A rare case of infection of a calf with hydatid.] [Abstract.] *Veterinariya*, **37** (4), 57. [In Russian.]

1732—PIYANZOV, M. S., 1960. [Housing of calves—an effective method of control of dictyocauliasis.] [Abstract.] *Veterinariya*, **37** (4), 55. [In Russian.]

1733—RANATUNGA, P., 1960. [Veterinary Laboratory, Peradeniya, Ceylon.] "1. Investigation of the efficacy of sulphadimidine in preventing coccidiosis of buffalo calves. 2. Further confirmatory evidence for prenatal *Ascaris* infection in buffalo calves." *Ceylon Veterinary Journal*, **8** (1), 20–25. On the government farm in Ridiyagama, 22 buffalo calves were passing ascarid eggs 10 to 26 days after birth, indicating that infection with *Neascaris vitulorum* had been pre-natal. Dosing dams with piperazine six weeks before parturition did not appear to control infection of the calves. The author suggests that mortality amongst the calves was more likely due to the ascariasis than to coccidiosis which also prevailed on the farm.

G. I. Pozniak

1734—SOBOLEV, A. S., 1960. [Prevention of dictyocauliasis in calves in Estonia by enclosing them in cowsheds and on adjacent pastures.] [Abstract.] *Veterinariya*, **37** (4), 55. [In Russian.]

1735—SUNDARAM, R. H. & NATARAJAN, R., 1960. [Department of Flaying and Meat Inspection, Madras Veterinary College, India.] "A study of the incidence of hydatid disease in cattle in the city of Madras." *Indian Veterinary Journal*, **37** (1), 19–24.

Examination of carcasses of 547 zebu cattle and 706 buffaloes at the city of Madras abattoir revealed that the respective incidence of hydatid disease was 13.5% and 11.61%. The localization of the cysts was in the following decreasing order: lungs, liver and spleen. The percentage of different forms of cysts was, in zebu cattle and buffaloes respectively, unilocular cysts 96.96% and 95.31%, multilocular cysts 0.18% and 0.86%, degenerated cysts 2.86% and 3.75%, sterile cysts 81.43% and 87.03%, fertile cysts 18.57% and 12.96%. The authors go on to describe the physical appearance of the fertile and sterile cysts. It is suggested that in view of the total absence of *Cysticercus tenuicollis*, it is likely that dogs in Madras do not get *Taenia hydatigena* infection through cattle and that bovines are completely immune from this form of cysticerciasis.

N. Jones

1736—SWANSON, L. E., 1959. [Department of Veterinary Science, University of Florida, Gainesville, Florida, U.S.A.] "Leeches (hirudineans) in the teat canals or udders of cattle." *Journal of the American Veterinary Medical Association*, **135** (5), 278.

After noting the occurrence of a specimen of *Limnatis nilotica* in the nasal passage of a horse in China, Swanson describes the finding of leeches in the teat canals or udders of a herd of milking cows in Hillsboro County, Florida. No leeches were found on the external surfaces and no distress was apparently caused in the cows. The leeches were usually expressed in the strippings before the milking machines were attached. Altogether 31 were found; of these five were identified as *Macrobdella ditetra* and one as *Haemopsis* sp. For control it was recommended that the pasture was eliminated and the ponds drained.

S. Willmott

Sheep and Goats

See also Nos.: 2024, 2062, 2073, 2115, 2135, 2156, 2203, 2209, 2239, 2241, 2242, 2246, 2254, 2282, 2283, 2287, 2293, 2294, 2295, 2311.

1737—ANON., 1957. "Worms and weather." **Rural Research in C.S.I.R.O. Melbourne**, No. 19, pp. 2-9.

Study of the records of seasonal changes in the worm burden of many hundreds of sheep spread over a wide area of the higher rainfall regions of Australia have led to the working out of effective strategic and tactical drenching programmes. The species listed as pathogenic for sheep in Australia are *Haemonchus contortus*, *Trichostrongylus* spp., *Oesophagostomum columbianum*, *Chabertia ovina* and *Ostertagia* spp.

G. I. Pozniak

1738—ARMSTRONG, M. C., 1959. [Department of Agriculture, Timaru, New Zealand.] "Unthriftiness of lambs in South Canterbury." **New Zealand Journal of Agriculture**, **99** (4), 335, 337-338.

This is an account of the occurrence of unthriftiness in lambs in South Canterbury and is intended for farmers. It summarizes the results of feeding cobalt, iron and selenium salts to lambs and discusses the causes of outbreaks. Severe outbreaks of disease were always associated with parasitic infection, *Ostertagia* spp., *Trichostrongylus* spp. and *Nematodirus* spp. being the important forms concerned. Armstrong recommends fine particle phenothiazine for control of *Ostertagia* infections and bephenium embonate for the prevention and treatment of *Nematodirus* infections.

H. D. Crofton

1739—BENNETTS, H. W., 1958. [Animal Health and Nutrition Laboratory, Perth, Western Australia.] "Unthriftiness of weaner sheep in Western Australia." **Australian Veterinary Journal**, **34** (11), 398-400. [Discussion pp. 400-401.]

Bennetts discusses unthriftiness in sheep after weaning in Western Australia. He states that this is a very serious problem and appears to be unrelated to either mineral deficiency or parasitic infection, although infection with *Chabertia ovina* may have a contributory effect.

H. D. Crofton

1740—ENGEL, A. E., 1958. [Department of Agriculture, Hamilton, Victoria, Australia.] "Unthriftiness of weaner sheep in south-western Victoria" **Australian Veterinary Journal**, **34** (11), 391-397. [Discussion pp. 400-401.]

Engel has summarized the causes of unthriftiness in sheep after weaning, data being taken from 146 cases in south-western Victoria, Australia. He suggests that overstocking in late summer and winter results in malnutrition and the production of heavy worm burdens. The combination of these factors causes outbreaks of parasitic gastro-enteritis in which *Trichostrongylus* spp. and *Ostertagia* spp. are mainly concerned. He emphasizes the importance of nutritional factors and describes trials in which both anthelmintics and supplementary feeding were given.

H. D. Crofton

1741—GEIDAROV, 1960. [The use of tin arsenate against *Moniezia* and *Thysaniezia* infections in sheep.] [Abstract.] **Veterinariya**, **37** (4), 57. [In Russian.]

1742—GIBBS, H. C. & PULLIN, J. W., 1960. [Animal Pathology Laboratories, Health of Animals Division, Canada Department of Agriculture, Branch Laboratory, Macdonald College, Quebec, Canada.] "A study on the control of lungworm (*Dictyocaulus filaria*) in sheep during the winter months." **Canadian Journal of Comparative Medicine and Veterinary Science**, **24** (4), 115-119.

This paper describes the use of cyanacethydrazide (0.4 ml. per 14 lb. body-weight of a 25 gm. per 80 ml. solution) together with rotation of lambs into clean pens every four days in the treatment of *Dictyocaulus filaria* infection in sheep. The results of both faecal larval counts and of adults recovered on post-mortem indicate that in comparison with the controls rotation as well as drug therapy gave complete clearance and drug therapy gave clearance in three of the four animals. Rotation alone gave a reduction in faecal larval count.

K. R. Heath

- 1743—GIBSON, T. E., 1959. [Central Veterinary Laboratory, Weybridge, Surrey, U.K.] "Controlled tests with various anthelmintics against *Nematodirus* spp. in sheep." **Veterinary Record**, **71** (21), 431-434.

Eight anthelmintic compounds, including phenothiazine, were tested against infections of *Nematodirus fillicollis* or *N. battus* experimentally induced in a small number of lambs bred worm-free. The lambs were dosed three weeks after infection and autopsied five days later when comparative worm counts were made with those in untreated controls. Phenothiazine alone gave approximately 60% efficiency at 10 gm. dosage whereas 11.5 gm. of a phenothiazine and 1:1'-di-n-butyl-2:2'-carbocyanine iodide mixture was almost 100% efficient. Piperazine adipate, -citrate and -carbodithioic acid gave variable results but were ineffective against larval forms; n-butyl-N-phenyldithiocarbamate and a mixture of chlorinated aliphatic hydrocarbons were ineffective against adults or larvae; bephenium embonate was 90% to 99% efficient against both adults and larvae at 125 or 250 mg. per kg. body-weight. It is concluded that although 1:1'-di-n-butyl-2:2'-carbocyanine iodide is effective, its toxicity precludes its use and that bephenium is the only reliable compound available at present for the treatment of nematodiriasis.

O. D. Standen

- 1744—KARABAEV, D. K., 1958. [Kazakh Scientific Research Veterinary Institute, U.S.S.R.] "Le changement de l'helminthofaune des ovins au Kazakhstan central en correspondance avec la modification des conditions extérieures." **Bulletin de l'Office International des Épipizooties**, **49** bis, (11/12), 223-233. [Also in English pp. 234-243.]

Karabaev discusses the changes in the helminth fauna of sheep in Central Kazakhstan. He gives some examples of helminths lost and acquired due to the movements of sheep. [See also *Helm. Abs.*, **22**, No. 996 bq.]

N. Jones

- 1745—KATES, K. C. & TURNER, J. H., 1960. [Parasitological Laboratory, Animal Disease and Parasite Research Division, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland, U.S.A.] "Experimental trichostrongylosis (*axei*) in lambs, with a discussion of recent research on this disease in ruminants." **American Journal of Veterinary Research**, **21** (81), 254-261.

Kates & Turner gave single doses of 50,000 to 500,000 larvae of *Trichostrongylus axei* to six lambs. The lamb given the highest dose survived but the other five lambs developed fatal infections. The symptoms of the lambs are described and details are given of the worm egg counts, and blood and weight changes. The number of worms recovered at death varied from 5,000 to 45,000, there being an inverse relationship between the number recovered and the number of larvae administered. Details of the carcasses are given. Histological examination showed that the worms caused erosion of the mucosa of the abomasum and duodenum. There is a short summary of recent work on the pathogenic effects of *T. axei* in sheep and other ruminants.

H. D. Crofton

- 1746—KATIYAR, R. D., 1960. [Central Sheep and Wool Research Station, Pashulok-Rishikesh, Dehra Dun, Uttar Pradesh, India.] "Lumbar paralysis amongst sheep and goats of Uttar Pradesh." **Indian Veterinary Journal**, **37** (4), 167-174.

Lumbar paralysis of sheep and goats diagnosed as cerebrospinal nematodiasis is reported for the first time from Uttar Pradesh. The disease appears during September-December and its symptoms and post-mortem lesions are briefly considered. In treatment trials, hetrazan gave encouraging results leading to the recovery of 82.1% of animals when administered orally in water in doses of 6 to 8 tablets of 0.2 gm., according to weight, on two successive days and a single dose again after a week.

G. I. Pozniak

- 1747—KELLEY, G. W., HARRIS, L., ALEXANDER, M. A. & OLSEN, L. S., 1960. [Department of Animal Pathology and Hygiene, University of Nebraska, Lincoln, Nebraska, U.S.A.] "Hygromycin B for removing *Thysanosome actinioides*, fringed tapeworms from feedlot lambs." **Journal of the American Veterinary Medical Association**, **136** (10), 505-507.

Trials with feed-lot lambs showed that parasitism with *Thysanosoma actinioides* could be considerably reduced by including 19.2 mg. of hygromycin B per lamb in the daily ration for 30 days. The treatment was concluded to be economically justifiable since it reduced liver condemnation and enhanced growth.

P. L. Thomas

1748—LUCKER, J. T. & FOSTER, A. O., 1958. [Animal Disease and Parasite Research Division, U.S. Department of Agriculture, Beltsville, Maryland, U.S.A.] "Parasites and parasitic diseases of sheep." **Farmers' Bulletin. U.S. Department of Agriculture**, No. 1330, 50 pp. [Revised.]

This bulletin has been slightly revised since the 1957 issue. It contains descriptions and natural size illustrations of the helminth parasites of sheep which occur in the U.S.A. For each parasite there are notes on localization, appearance, life-history, distribution, damage and symptoms, treatment and control. There are photographs of sheep infected with *Haemonchus contortus*, *Trichostrongylus* spp., *Elaeophora schneideri* and *Coenurus cerebralis*; of lesions caused by *Ostertagia* spp., *Oesophagostomum columbianum* and *Echinococcus granulosus*; of *Lymnaea bulimoides* and the cercariae of *Fasciola hepatica*, and a beetle mite containing cysticercoids of *Moniezia expansa*. The Latin names of the parasites are not always given in the section dealing with the infections, but are listed in a table with the common name. The uses of the common anthelmintics are discussed, with dose rates, and the application of phenothiazine-salt lick is described. The bulletin includes notes on external parasites and coccidia.

H. McL. Gordon

1749—MERDIVENCI, A., 1957. "Ehli koyun (*Ovis aries*) larimizda bulduğumuz *Cooperia oncophora* (Railliet, 1898) Ransom, 1907 (fam. Trichostrongylidae)." **Türk Veteriner Hekimleri Derneği Dergisi**, 27 (132/133), 3683-3692. [English summary p. 3690.]

Merdivenci reports on the occurrence of *Cooperia oncophora* in the anterior parts of the small intestine of sheep. This is the first record in Turkey.

T. Öden

1750—MUSIENKO, I., 1960. [The eradication of fascioliasis in sheep.] [Abstract.] **Veterinariya**, 37 (4), 55. [In Russian.]

1751—OSBORNE, H. G., 1958. [Veterinary School, University of Queensland, Yeerongpilly, Queensland, Australia.] "Observations on the seasonal incidence of acute fascioliasis and infectious necrotic hepatitis (black disease) in sheep." **Australian Veterinary Journal**, 34 (10), 301-304.

Osborne reports that 10 out of 13 outbreaks of acute fascioliasis which occurred in the New England district of New South Wales took place during June, July and August. He concludes that seasonal conditions which force the sheep to graze on moister, fluke-infested ground are responsible.

N. Jones

1752—PASKALSKAYA, M. Y. ET AL., 1960. [Chemoprophylaxis of monieziasis in sheep.] [Abstract.] **Veterinariya**, 37 (4), 57. [In Russian.]

1753—RONZHINA, G. I., SELIVERSTOV, P. A. & MAKRUSHIN, P. V., 1960. [Saratovski zoovetinstitut, Saratov, U.S.S.R.] [Phenothiazine-salt mixture against strongylate nematode infections in sheep.] **Veterinariya**, 37 (3), 34-37. [In Russian.]

An almost complete reduction of *Dictyocaulus* and gastro-intestinal strongylids was achieved two years after the introduction, on a Saratov state farm, of small daily doses of a phenothiazine-salt mixture for sheep throughout their pasturing period from May to November. Deaths ceased and an additional 2,871 kg. of wool (equivalent to 49,000 roubles) was obtained in the second year from over 6,000 sheep. The cost of the phenothiazine was 16,000 roubles yearly. The blood picture of healthy sheep remained unaffected by two months of phenothiazine-salt therapy, and the fall in the carotene and vitamin A content of the plasma was less than in controls (receiving salt only) while the albumin content increased in sheep receiving phenothiazine but fell in those receiving only salt.

G. I. Pozniak

1754—SCHULZ, J. A. & HEIDE, D., 1959. [Medizinische Tierklinik der Karl-Marx-Universität, Leipzig.] "Beitrag zur Aërosolbehandlung des Lungenwurmbefalles der Schafe." **Monatshefte für Veterinärmedizin**, 14 (10), 312-314.

This paper describes the use of aerosol therapy to cure lungworm infections in sheep. The sheep are placed in a wooden cage with a linen cover and Ascaridol is pumped in by the use of compressed air to produce an aerosol with particle size of 0.5 to 5 μ . The best results were obtained by 10 minutes' exposure which removed the lungworms from 43 animals. Longer exposure to the aerosol causes a temporary rise in temperature and central nervous disturbance. The method was shown to be efficient and not costly. Further work is being carried out with an iodine glycerin aerosol and first reports are satisfactory.

K. Heath

1755—SHMAKOV, V. T. & MIRONOV, V. I., 1960. [The use of carbon tetrachloride against fascioliasis in sheep.] [Abstract.] *Veterinariya*, **37** (4), 56. [In Russian.]

1756—SHUMAKOVICH, E. E., 1958. [All-Union Skryabin Institute of Helminthology, U.S.S.R.] "Coenurosis of sheep and its control in the U.S.S.R." *Bulletin de l'Office International des Épizooties*, **49** bis (11/12), 640-642.

Shumakovich briefly discusses the distribution of coenuriasis of sheep and the measures taken against this helminthiasis in the U.S.S.R. N. Jones

1757—SOOD, S. M., 1960. [Department of Parasitology, U. P. College of Veterinary Science and Animal Husbandry, Mathura, India.] "On the occurrence of an adult amphistome in sheep lung." [Correspondence.] *Current Science, Bangalore*, **29** (1), 24-25.

Sood records finding a living, mature specimen of *Cotylophoron* sp. in an areca-nut sized cyst in the apical lobe of the right lung of a sheep killed in the local abattoir. S. Willmott

1758—TETLEY, J. H., 1959. [Massey Agricultural College, Palmerston North, New Zealand.] "The seasonal availability to sheep of infective nematode larvae on pasture." *Journal of Helminthology*, **33** (4), 281-288

Tetley, in New Zealand, exposed worm-free Romney lambs to infection by allowing them to graze on a pasture carrying a flock of Southdown ewes and their lambs. The flock ewes and lambs received anthelmintic treatment in November. The lambs were weaned in January, the ewes being removed. On March 5th the flock lambs were replaced by mature Southdown sheep. The Romney lambs were introduced to the pasture in groups of four, each group being allowed to graze for a fortnight before being killed and examined for worms. Twelve such groups were used between December 7th, 1950 and May 23rd, 1951. The results of the fortnightly worm counts are given, identification being based on larvae. *Ostertagia* spp. and *Nematodirus* spp. were found in greatest number and species of these two genera and *Haemonchus contortus* had marked seasonal differences in abundance. Seasonal variation was not observed in the low numbers of *Trichostrongylus* spp. and *Cooperia* spp. *Nematodirus* spp. was found in greatest numbers from March until May while *Ostertagia* spp. and *H. contortus* were most frequent in January. Tetley concluded that the autumn increase in *Nematodirus* spp. provided infective stages in the following spring but that the summer increase of *Ostertagia* spp. permitted successive generations in the same year; in the case of *H. contortus* successive generations could occur only if climatic conditions were favourable.

H. D. Crofton

1759—TETLEY, J. H., 1959. [Massey Agricultural College, Palmerston North, New Zealand.] "The availability of the infective stages of nematode parasites to sheep in early spring." *Journal of Helminthology*, **33** (4), 289-292.

Tetley studied a New Zealand pasture, which had been grazed for some years by sheep, by introducing into it eight 11-month-old Romney sheep. These sheep, which had been reared free from parasitic infection, were allowed to graze for three weeks from August 10th. They were then killed and examined. The immature worms found were identified and counted, the species present being *Ostertagia circumcincta*, *Nematodirus fillicollis*, *N. spathiger*, *Trichostrongylus colubriformis*, *T. vitrinus*, *Cooperia curticei*, and *Strongyloides papillosus*. The numbers of *Ostertagia* spp. and *Nematodirus* spp. recorded were ten to twenty times greater than those recorded for the other species. Tetley concluded that *Ostertagia* spp. and *Nematodirus* spp. predominate in spring infections of lambs because the infective stages of these genera predominate at this time. He rejects the idea that young lambs are more susceptible to these species.

H. D. Crofton

1760—TETLEY, J. H., 1959. [Massey Agricultural College, Palmerston North, New Zealand.] "The extent to which self-augmentation of nematode parasitism occurs in lambs." *Journal of Helminthology*, **33** (4), 293-300.

Tetley defines "self-augmentation" as the growth of parasite populations in hosts resulting from eggs emanating from existing parasites in members of the same flock. To observe if "self-augmentation" occurred he used 36 weaned lambs and 15 sheep, all of which had been reared worm-free, to graze a paddock occupied by a normally infected flock of ewes and

lambs. The worm-free sheep were divided into three groups and the first group allowed to graze from November 29th to December 20th. The second group grazed from December 20th to January 10th, and the third group from January 10th to January 31st. The members of each group were killed and examined for immature worms immediately after they had completed their grazing period. *Ostertagia* spp. and *Nematodirus* spp. were found in large numbers but relatively low counts were recorded for *Haemonchus contortus*, *Trichostrongylus* spp., *Cooperia* spp. and *Strongyloides papillosus*. There was only evidence of increasing infections in the case of *Ostertagia* spp. during the experiment and Tetley suggests that while "self-augmentation" occurs with *Ostertagia* in spring, it does not occur, or only to a minor extent, with the other species before midsummer.

H. D. Crofton

- 1761**—TETLEY, J. H., 1959. [Massey Agricultural College, Palmerston North, New Zealand.] "Development of *Haemonchus contortus* in weaned and unweaned lambs." *Journal of Helminthology*, **33** (4), 301–304.

Tetley administered known numbers of infective larvae of *Haemonchus contortus* to weaned and unweaned lambs which had been reared free from parasitic infection. Larvae were administered to one group of four lambs, six weeks old, when their mothers' milk production was high; a second group of five six-week-old lambs received their inoculation as their mothers' milk was declining; the third group, which consisted of eight ten-week-old lambs, was given larvae when the milk production of the mothers had fallen considerably. The lambs in each group were killed two or three weeks after infection and worm counts were made. Weaned lambs, three months and six months old, were treated similarly. It was concluded from the worm counts that there was no significant difference between the numbers of larvae developing in weaned and unweaned lambs.

H. D. Crofton

- 1762**—VOITENKO, D. D., 1960. [The joint use of hexachlorethane and carbon tetrachloride against fascioliasis in sheep.] [Abstract.] *Veterinariya*, **37** (4), 56. [In Russian.]

- 1763**—YAMOV, V. Z., 1960. [Efficacy of a combined method of treatment in the control of monieziasis of sheep.] [Abstract.] *Veterinariya*, **37** (4), 57. [In Russian.]

Pigs (Swine)

See also Nos.: 1789, 2124, 2156, 2173, 2263, 2264, 2307.

- 1764**—BEREZANTSEV, Y. A., 1960. [Trichinelliasis in pigs and its prophylaxis.] *Veterinariya*, **37** (5), 24–26. [In Russian.]

From data in the literature and his own experience, Berezantsev discusses the epizootiology of trichinelliasis in pigs in Russia in relation to the role played by rats, cats and dogs, the existence of wild reservoir hosts and its prophylaxis.

G. I. Pozniak

- 1765**—DOLNIKOV, 1958. "Méthode de déshelminthisation des porcs atteints d'ascaridiose." *Bulletin de l'Office International des Épizooties*, **49** bis (11/12), 666–668.

Dolnikov discusses the treatment of ascariasis in pigs with sodium silicofluoride, which is much cheaper than that with santonin and calomel, and reports on the dosage and the efficacy of the drug. [See also Helm. Abs., **25**, No. 305e.] The drug must not be given to sows 15 days before farrowing or in the course of the first week thereafter; nor must it be given to piglets less than 70 days old.

N. Jones

- 1766**—GADZHIEV, D. V., 1957. [A case of coenuriasis in wild boar.] *Dokladi Akademii Nauk Azerbaidzhanskoi SSR.*, **13** (5), 565–568. [In Russian.]

A coenurus of *Multiceps multiceps* is reported from the brain of a wild boar for the first time in Azerbaidzhan. It was situated near the optic nerve and caused blindness.

G. I. Pozniak

- 1767—HILL, D. H. & ONABAMIRO, S. D., 1960. [Faculty of Agriculture, University College, Ibadan, Nigeria.] "Vesical schistosomiasis in the domestic pig." **British Veterinary Journal**, **116** (4), 146-150.

Hill & Onabamiro report the occurrence of vesical schistosomiasis in two pigs in Ibadan. A Large White boar had haematuria and refused to serve any of the sows. Urine samples contained schistosome ova morphologically identical with or closely resembling *Schistosoma haematobium*. After treatment with nilodin all traces of blood and schistosome ova disappeared. At post-mortem 18 months later no gross lesions and no adult schistosomes were found. In the second case, a Tamworth sow which was passing bloody urine containing non-viable schistosome ova was not treated. At post-mortem degenerate bodies similar to schistosome ova were found in the lung. No adult flukes were seen. *Physopsis africana* from a nearby village soakaway were examined but were found to be negative. Only five of 200 snails exposed to infection with *S. haematobium* from Epe (60 miles from Ibadan) discharged cercariae and these snails died within a week of the infection reaching maturity. Young pigs were infected with these cercariae but eggs were not subsequently found in the faeces. Hill & Onabamiro conclude from this evidence that the domestic pig does not serve as an important reservoir host for *S. haematobium* in Nigeria although the disease could under certain conditions be a swineherd problem.

D. L. H. Robinson

- 1768—JORDANO BAREA, D. & GONZÁLEZ GALLARDO, B., 1959. "Pelos de orugas hallados como cuerpos extraños en el análisis triquinoscópico de carne de cerdo." **International Veterinary Congress (16th)**, Madrid, May 21-27, 1959. Vol. II, pp. 755-756.

Hairs of caterpillars were found in one in every four or five preparations of the sublingual muscles of pigs during trichinoscopic examinations.

N. Jones

- 1769—KORYAZHNOV, V. P., 1960. [Moskovakaya veterinarnaya akademiya, Moscow.] [The distribution of *Trichinella* in the pig.] **Veterinariya**, **37** (5), 68-69. [In Russian.]

Koryazhnov acknowledges the value of Kosminkov's work [for abstract see Helm. Abs., **29**, No. 609] but disagrees that in the examination of pig carcasses for *Trichinella* the oesophagus can be substituted for the diaphragm. He suggests that the answer lies in a suitable time adjustment in the conveyor system of slaughtering to allow for the examination of the diaphragm before the separation of the internal organs etc. [see also abstract No. 1770 below].

G. I. Pozniak

- 1770—MERKUSHEV, A. V., 1960. [Trichinelloscopy of pigs.] **Veterinariya**, **37** (5), 69. [In Russian.] Merkushev has found *Trichinella* larvae in all the oecophagi of 10 wolves, one fox (natural infections), 82 white mice, three dogs, four rabbits and one suslik (experimental infections). He therefore agrees with Kosminkov [for abstract see Helm. Abs., **29**, No. 609] that the oesophagus should replace the diaphragm in trichinelloscopy of pigs. In many slaughterhouses, however, this would not be useful and in such cases the attaching of the already separated parts to the carcass, until the completion of the test, is advocated [see also abstract No. 1769 above].

G. I. Pozniak

- 1771—MIKHNYUK, S. P., 1960. [The oesophagus in pigs—valuable material for tests for trichinellosis.] [Abstract.] **Veterinariya**, **37** (4), 58. [In Russian.]

- 1772—NAKAJIMA, T., 1958. [Gumma Prefectural Office, Maebashi, Japan.] [A study on *Strongyloides ransomi*.] **Journal of the Japan Veterinary Medical Association**, **11** (4), 163-165. [In Japanese.] In Gumma Prefecture, *Strongyloides ransomi* infection was prevalent among young pigs, causing diarrhoea and sometimes resulting in stunted growth. The natural infection cycle of this species is as yet inadequately explained. Anthelmintic measures are to be recommended for young pigs about two weeks old.

Y. Yamao

- 1773—QUEIROZ, J. C. DE & MELLO, D., 1958. "Ofloureto de sódio na ascaridiase suína." **Biológico. São Paulo**, **24** (8), 165-169.

Queiroz & Mello discuss the use of sodium fluoride against ascariasis and other helminth infections in swine. Although the drug is highly poisonous, in the dosage described it is

very effective against *Ascaris lumbricoides*, *Ascarops strongylus* and *Physocephalus sexalatus* but not against *Oesophagostomum*, *Trichuris* or *Macracanthorhynchus*. The recommended dose rate is 1% of a dry ration the amount of which depends on the animal's weight (1 kg. for pigs weighing 30 kg.) on one day. Vomiting and diarrhoea may follow even this dosage. The treatment should not be repeated more than four to five times in the animal's life.

W. K. Dunscombe

1774—RESPALDIZA CARDEÑOSA, E., 1959. "Ictericia ascaridiana en el cerdo." **International Veterinary Congress (16th), Madrid**, May 21–27, 1959. Vol. II, pp. 565–566.

Ascaris lumbricoides was found in the intestinal tract and in the common bile-duct of two pigs, which presented intense icterus before they died. The common bile-duct was totally occluded in the first case and partially occluded in the second. In both cases one worm was present. The liver showed degeneration in both cases.

N. Jones

1775—YUDIN, A. M., 1960. [Group treatment of piglets for ascariasis.] [Abstract.] **Veterinariya**, **37** (4), 58. [In Russian.]

Elephants

No relevant abstracts in this issue

Camels and Llamas

1776—ABDEL MALEK, E., 1959. [University of Khartoum, Sudan.] "Helminth-parasites of the camel, *Camelus dromedarius*, in the Sudan." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 38–39.

The following parasites are recorded from 17 camels in the central Sudan: *Avitellina woodlandi*, *Trichuris globulosa*, *Echinococcus granulosus* cysts, *Haemonchus longistipes*, *Impalaia* sp., *Oesophagostomum venulosum*, *Schistosoma bovis*, *Moniezia expansa* and *Nematodirus* sp. Abdel Malek considers that further surveys might show *Dictyocaulus viviparus* as it occurs in Egypt in camels imported from the Sudan.

N. A. Hancock

1777—ASADOV, S. M., 1957. [Analysis of the helminth fauna of the dromedary (*Camelus dromedarius* L., 1758) in Azerbaidzhan.] **Dokladi Akademii Nauk Azerbaidzhanskoi SSR.**, **13** (7), 781–784.

15 helminths were found on examination of three slaughtered dromedaries, bringing the number of species known for this host in Azerbaidzhan up to 18. These are: *Dicrocoelium dendriticum*, *Echinococcus granulosus*, *Camelostrongylus mentulatus*, *Capillaria bovis*, *Cooperia oncophora*, *C. zurnabada*, *Dictyocaulus cameli*, *Haemonchus contortus*, *Marshallagia marshalli*, *Oesophagostomum venulosum*, *Trichuris ovis*, *T. skrjabini*, *Trichostrongylus axei*, *T. capricola*, *T. colubri-formis*, *T. probolurus*, *T. skrjabini* and *T. vitrinus*.

G. I. Pozniak

1778—KORNIENKO-KONEVA, Z. P. & OREKHOV, M. D., 1958. "La prophylaxie de quelques maladies parasitaires des chameaux dans la R.S.S. de Turkménie." **Bulletin de l'Office International des Épidémiologies**, **49** bis (11/12), 297–304. [Also in English pp. 305–312.]

Dipetalonema evansi infection in camels in Turkmenia is most frequent among animals grazing in the river zone where the incidence of infection is 46·8%. The incidence is much lower in the salt marsh zone (8·4%) and the disease is absent in sandy desert zones. *Aedes detritus* is suspected to be the intermediate host. New prophylactic measures consist of grazing resting camels in zones free from infection and examining those animals that have to remain in the endemic zones in March, so that infected animals may be treated with a single dose of 0·5 ml. of fuadin per kg. of body-weight.

N. Jones

Rabbits and Hares

See Nos.: 1685, 1770, 2159, 2203, 2220, 2223, 2224, 2262, 2263, 2273, 2284, 2285, 2287, 2288.

Cats and Dogs

See also Nos.: 1632, 1649, 1685, 1735, 1764, 1770, 1963, 1996, 2045, 2053, 2059, 2078, 2087, 2107, 2109, 2116, 2122, 2127, 2129, 2139, 2156, 2164, 2181, 2193, 2218, 2219, 2223, 2225, 2237, 2238, 2298, 2306.

1779—ABDEL MALEK, E., 1959. [University of Khartoum, Sudan.] "Spirocercosis in Khartoum dogs." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 39.

11 out of 24 dogs examined were infected with *Spirocerca lupi*, adults occurring in the walls of the oesophagus, stomach and thoracic portion of the aorta. Two cases were fatal aortic spirocerciasis with ruptured vessel wall; partial obstruction of the oesophagus by large nodules was found in some cases. Four foxes examined had this spiruroid and showed large aortal nodules. Abdel Malek considers that this reservoir host and the abundant intermediate hosts, mainly beetles, are important factors in the spread of this disease.

N. A. Hancock

1780—BHATIA, B. B., SOOD, S. M. & PANDE, B. P., 1959. [Department of Parasitology, U.P. College of Veterinary Science and Animal Husbandry, Mathura, India.] "An opisthorchid trematode from the domestic cat (*Felis catus domesticus*) with a report on three other helminths." *Indian Veterinary Journal*, **36** (11), 528-531.

Paropisthorchis caninus is recorded for the first time from a cat in India. The pathology of the infection is described. *Dipylidium gervaisi* from *Felis viverrina* in the Calcutta Zoological Gardens is another new host record. *Rictularia cahirensis* and *Physalopsera praeputialis*, which the authors also found, are annotated.

S. Willmott

1781—CALDAS, A. D., QUEIROZ, J. C. DE & MELLO, D., 1958. "Ocorrência da filariose canina no Estado de São Paulo. Observações sobre um caso clínico." *Biológico. São Paulo*, **24** (4), 70-73. [English summary p. 73.]

Caldas *et al.* report a case of *Dirofilaria immitis* in a four-year-old Cocker spaniel living in São Paulo. The infection, was believed to have been contracted in Japan. Symptoms, which had lasted for ten months, were breathlessness and an intractable itch which cleared up with trivalent antimony treatment. The risk of the animal acting as a reservoir in São Paulo State, where there are suitable vectors, is pointed out.

W. K. Dunscombe

1782—DETWEILER, D. K., HUBBEN, K. & PATTERSON, D. F., 1960. [School of Veterinary Medicine, University of Pennsylvania, Philadelphia, U.S.A.] "Survey of cardiovascular disease in dogs—preliminary report on the first 1,000 dogs screened." *American Journal of Veterinary Research*, **21** (82), 329-359.

The screening methods employed revealed abnormalities in about 177 of 1,000 dogs examined and cardiovascular disease was confirmed by further clinical or post-mortem studies (or both) in 97. Amongst the commonest heart diseases encountered was right vulvul dilatation and hypertrophy associated with *Dirofilaria immitis* infection. This condition is characterized by typical electrocardiographic and roentgenologic signs.

G. I. Pozniah

1783—GERASIMOVA, G. N., 1960. [Change in the helminth fauna of dogs in Omsk.] [Abstract.] *Veterinariya*, **37** (4), 58. [In Russian.]

1784—ISHIHARA, K., SUGANUMA, Y. & SAKAI, T., 1959. [Department of Medicine, School of Veterinary Medicine, University of Gifu, Naka P. O., Japan.] [Effect of 1-bromo-naphthol-(2) on intestinal parasites of dogs.] *Journal of the Japan Veterinary Medical Association*, **12** (1), 8-12. [In Japanese: English summary p. 12.]

1-bromo-naphthol-(2) at 200 mg. per kg. body-weight was effective against canine hookworm infection when it was given twice or three times between meals. When it was administered at the rate of 100 mg. per kg. or more, canine ascarids were completely expelled. Canine whipworm eggs were reduced in the faeces when the drug was administered at the rate of 200 mg. per kg. twice between meals. It was ineffective against canine tapeworms, even when the dose was as much as 1,500 mg. per kg.

Y. Yamao

1785—ITO, J., WATANABE, K., NOGUCHI, M., MOCHIZUKI, H. & MAEKAWA, T., 1958. [Hygiene Laboratory, Faculty of Education, Shizuoka University, Shizuoka, Japan.] [An investigation of the helminth parasites of dogs in Shizuoka Prefecture. I. General aspect.] **Japanese Journal of Parasitology**, **7** (6), 674–679. [In Japanese: English summary p. 679.]

192 dogs were examined post mortem for helminths from July 1956 to July 1957, in Shizuoka Prefecture. The combined parasitic rate was 100% and 14 species were found. The average number of species found in one dog was 2.5 and the maximum number of species harboured was six. The species most frequently found were: *Ancylostoma caninum*, *Dipylidium caninum*, *Dirofilaria immitis* and *Trichuris vulpis*. *Paragonimus* was mostly prevalent in the western part of the Prefecture. Y. Yamao

1786—ITO, J., WATANABE, K., NOGUCHI, M., MOCHIZUKI, H. & MURAKAMI, M., 1959. [Hygiene Laboratory, Faculty of Education, Shizuoka University, Shizuoka, Japan.] [An investigation of the helminth parasites of dogs in Shizuoka Prefecture. 4. Trematodes.] **Japanese Journal of Parasitology**, **8** (4), 453–457. [In Japanese: English summary pp. 456–457.]

Four species of trematodes, *Paragonimus westermani*, *Metagonimus yokogawai*, *M. yokogawai* var. *takahashii* and *Pseudoheterophyes continua* major, were identified from 192 dogs examined in Shizuoka Prefecture during 1956–57. Ten cases of *P. westermani* were found but the infection seemed to have no correlation with the age or sex of the dog. Only one case of *Pseudoheterophyes continua* major was recognized, while the *Metagonimus* infection (both *M. yokogawai* and *M. yokogawai* var. *takahashii*) showed an infection rate of 23.3%.

Y. Yamao

1787—NARDI, E., 1959. “Segnalazione di *Cryptocotyle concavum* (Creplin 1825) parassita dell'intestino tenue del cane e della volpe.” **Veterinaria Italiana**, **10** (3), 257–260.

Nardi found numerous specimens of *Cryptocotyle concavum* in the small intestine of three of ten foxes and one of five dogs. This is said to be the first record of this trematode in dogs in Italy and the first record in *Vulpes vulpes*. The paper gives a detailed description and an illustration of the parasite. N. Jones

1788—WILCOX, H. S., 1960. [Alabama Polytechnic Institute, Auburn, Alabama, U.S.A.] “Pulmonary arteriotomy for removal of *Dirofilaria immitis* in the dog.” **Journal of the American Veterinary Medical Association**, **136** (7), 328–338.

Wilcox describes the surgical technique used by him for the removal of heartworms from 20 dogs by means of a main trunk pulmonary arteriotomy. The thoracotomy was made through the fourth left intercostal space and the major venous return to the heart was interrupted for 2.5 to 4 minutes by venae cavae occlusions. Two resulting fatalities were attributed to ventricular fibrillation. Necropsy after a recovery period of three weeks showed that 91.1% of the worms had been removed. This surgical procedure is sufficiently safe and effective in dogs with light or moderate infections to warrant its use in selected clinical cases which are deemed poor risks for chemotherapy. The surgical procedure is illustrated by four clear photographs each with an explanatory diagram. G. I. Pozniak

Fur-Bearing Animals

See also No.: 2116.

1789—BAYANOV, M. G. & TOSHCHEV, A. P., 1959. [A case of trichinellosis in sable.] **Sbornik Nauchnikh Rabot Sibirskogo Nauchno-Issledovatel'skogo Veterinarnogo Instituta**, **8**, 213–214. [In Russian.]

Trichinella is reported for the first time in a sable; 203 animals were examined in the Irkutsk region and only one was infected. Trichinellosis in pigs has not been registered for this region. G. I. Pozniak

Laboratory Animals

See also Nos.: 1603, 1770, 2039, 2056, 2057, 2106, 2108, 2120, 2123, 2125, 2126, 2127, 2139, 2140, 2144, 2155, 2171, 2172, 2181, 2193, 2204, 2205, 2216, 2217, 2270, 2271, 2275, 2305.

- 1790—ALLEN, A. M., 1960. [Comparative Pathology Section, Laboratory Aids Branch, Division of Research Services, National Institute of Health, Bethesda, Maryland, U.S.A.] "Occurrence of the nematode, *Anatrichosoma cutaneum*, in the nasal mucosae of *Macaca mulatta* monkeys." **American Journal of Veterinary Research**, 21 (82), 389–392.

Anatrichosoma cutaneum infection of the nasal mucosa of six out of 17 *Macaca mulatta* examined at random, resulted in mild or moderate tissue reactions but had caused no gross lesions. The female parasites were free in the squamous epithelium of the mucosa, while small worms, presumed to be males or young worms of either sex, inhabited thin walled vessels of the lamina propria. The lesions caused by *A. cynamolgi* in one *M. philippinensis* were similar to those described for *A. cutaneum*, but the intravascular worms were observed in subcutaneous vessels of the skin overlying the alar cartilages. G. I. Pozniak

- 1791—HEYNEMAN, D., 1959. [University of California, Los Angeles, California, U.S.A.] "A population of branched tapeworms (*Hymenolepis nana*) found in a strain of DBA-1 mice." [Abstract.] **Journal of Parasitology**, 45 (4, Sect. 2), 26.

Primary abnormalities seen in *Hymenolepis nana* from a colony of DBA-1 mice were branched strobila (1–5 branches per worm) and inverted proglottis sequence. Branches occurred anywhere from the neck region to the end of the worm and control of strobilization occurs spontaneously at various points along the length. 5% of 1,500 worms examined showed abnormalities and such were found only in this strain of mice. N. A. Hancock

- 1792—LIENERT, E., 1959. [Tierärztliche Hochschule, Pharmakologisches Institut, Wien, Austria.] "Experimentelle Arbeiten auf dem Gebiet der Chemotherapie der Distomatose." **International Veterinary Congress (16th), Madrid**, May 21–27, 1959. Vol. II, pp. 597–599.

The action of carbon tetrachloride, hexachlorethane and filixan (drugs known to be effective against *Fasciola hepatica* in sheep and cattle) and of chloroform, tetrachlorethane and dichlorophen (drugs known to be ineffective) was tested on rabbits after mature flukes had been introduced into their abdominal cavities. The results obtained confirm that such rabbits are suitable subjects for chemotherapeutic tests. G. I. Pozniak

- 1793—YOKOGAWA, M. ET AL., 1959. "Studies on host-parasite relationship. I. Experimental infection in rats, mice and guinea pigs with the metacercariae of *Paragonimus ohirai* Miyazaki, 1939." [Abstract.] **Journal of Parasitology**, 45 (4, Sect. 2), 20–21.

The results of feeding metacercariae of *Paragonimus ohirai* to rats, mice and guinea-pigs are tabulated. About half of those fed to rats and mice developed, but none survived in guinea-pigs. The survival period of the worms decreased as the burden increased, and cyst formation in the lungs was only found where the infection was more than two worms per host.

N. A. Hancock

Poultry

See also Nos.: 1976, 2022, 2099, 2134, 2136, 2200, 2231, 2232, 2306, 2311.

- 1794—CHUBB, L. G., 1960. "Nutrition and poultry diseases." **Agriculture, London**, 66 (11), 481–484. Chubb discusses the role of nutrition in the resistance to diseases, helminthic among others, of poultry. N. Jones

- 1795—DOLNIKOV, Y. Y. & SHEVCHENKO, R. V., 1959. [The efficacy of sodium silicofluoride against ascariasis in fowls.] **Sbornik Nauchnikh Rabot Sibirskogo Nauchno-Issledovatel'skogo Veterinarnogo Instituta**, 8, 205–207. [In Russian.]

Sodium silicofluoride, when given in daily oral doses of 0.1 gm. for six days, cured ascariasis in 22% and 33% of experimentally infected domestic fowls, lowering intensities by 30%. A two-day treatment of 800 young birds on a farm reduced the rate of infection from 22% to 10%. Because of its low efficacy, sodium silicofluoride is not recommended against ascariasis in fowls. G. I. Pozniak

1796—MERDIVENCI, A., 1957. "Evcil kaz (*Anser anser dom.*) larimizda bulduğumuz *Notocotylus attenuatus* (Rudolphi, 1809): Trematoda." **Türk Veteriner Hekimleri Derneği Dergisi**, **27** (130/131), 3597–3606. [English summary p. 3603.]

Merdivenci reports on the finding of *Notocotylus attenuatus* from domestic goose (*Anser anser domestica*) which is the first record in Turkey. T. Öden

1797—PAVLOV, P. I., 1960. [The prophylaxis of drepanidotaeniasis in geese.] [Abstract.] **Veterinariya**, **37** (4), 58–59. [In Russian.]

1798—REID, W. M. & NUGARA, D., 1959. [University of Georgia, Athens, Georgia, U.S.A.] "Report on *Raillietina williamsi* in the domestic turkey." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 45.

1,400 domestic turkeys had heavy infections of *Raillietina williamsi* (Williams, 1931). The specimens differ in two ways from Williams' descriptions in **J. Parasit.**, **18**, 14–20. 2% had irregularly alternating genital pores instead of unilateral, and all had 260 rostellar hooks rather than 150 hooks. Reid & Nugara could find no previous record from the domestic turkey and consider that the infection came from mature wild turkeys brought into the flock. Five birds treated with 65 mg. of dibutyl tin oxide by capsule showed 100% elimination, nine given 125 mg. showed 99% elimination, 16 given 0.29% dibutyl tin dilaurate in the feed for five days showed 85% efficacy, and in 18 birds given five days' treatment of 3 pounds of Trithiadol per ton of feed, the elimination was 50%. N. A. Hancock

1799—SAWADA, I., 1959. [Department of Biology, Nara University of Arts and Sciences, Nara, Japan.] [Dichlorophen preparations for the removal of *Raillietina cesticillus* from chickens.] **Journal of the Japan Veterinary Medical Association**, **12** (2), 56–59. [In Japanese: English summary p.59.]

In hens infected with small numbers of *Raillietina cesticillus*, dichlorophen (300 mg. per kg. body-weight) combined with phenothiazine (300 mg. per kg.) administered in one single dose without fasting, was quite effective and the worms were eradicated. When the tapeworms were numerous complete elimination was difficult to achieve. A combined compound of dichlorophen (120–150 mg. per kg.), phenothiazine (100–130 mg. per kg.) and piperazine sulphate (50–80 mg. per kg.) showed an excellent anthelmintic effect. These treatments did not affect egg-laying. Y. Yamao

1800—SELIVANOVA, A. S., 1960. [Carbon tetrachloride treatment of *Echinuria* infections in ducks.] **Veterinariya**, **37** (4), 51–52. [In Russian.]

Selivanova has shown experimentally that, contrary to Mozgovoi & Bichikhin's results [for abstract see *Helm. Abs.*, **28**, No. 69f], *Echinuria* infection in ducks was only cured after three applications of carbon tetrachloride. The dead worms remained in the nodules until their decomposition and such nodules have been known to persist for up to seven to eight months. Eggs continued to be passed for three months or more, making determination of efficacy by faecal tests impossible. In all, 25,800 ducks on farms in the Omsk region were successfully treated by three applications (at weekly intervals) of carbon tetrachloride at a dose of 2 to 3 ml. without toxic side effects. G. I. Pozniak

1801—SELIVANOVA-YARTSEVA, A. S. & GERASIMOVA, G. N., 1959. [Helminth fauna of domestic aquatic birds in the Omsk region.] **Sbornik Nauchnikh Rabot Sibirskogo Nauchno-Issledovatel'skogo Veterinarnogo Instituta**, **8**, 189–191. [In Russian.]

Working in 1950–52 and again in 1957, the authors examined 706 domestic geese and ducks from the Omsk region and found 98% infected with helminths. The species present in geese were *Echinostoma revolutum*, *Notocotylus attenuatus*, *Drepanidotaenia lanceolata*, *D. przewalskii*, *Hymenolepis setigers*, *H. longicirrosa*, *H. fasciculata*, *Amidostomum anseris*, *Ganguleterakis dispar*, *Capillaria anatis*, *Trichostrongylus tenuis*, *Ascaridia anseris* and *Heterakis dispar*, and in ducks *N. attenuatus*, *E. revolutum* and *Hymenolepis collaris*. G. I. Pozniak

1802—ZHIDKOV, A. E., 1960. [The epizootiology of helminthiasis of domestic birds in the Omsk region.] [Abstract.] **Veterinariya**, **37** (4), 59. [In Russian.]

Other Mammals

See also Nos.: 1622, 1627, 1764, 1770, 1779, 1780, 1787, 1804, 1960, 1963, 1969, 1986, 1989, 1993, 1994, 1996, 2004, 2005, 2006, 2015, 2021, 2087, 2090, 2092, 2104, 2106, 2115, 2139, 2191.

1803—ASADOV, S. M., 1957. [Helminth fauna of *Gazella subgutturosa*.] *Izvestiya Akademii Nauk Azerbaidzhanskoi SSR.*, No. 8, pp. 83–88. [In Azerbaidzhan: Russian summary pp. 87–88.] The helminths found in *Gazella subgutturosa* in Azerbaidzhan are *Dicrocoelium dendriticum*, *Camelostrongylus mentulatus*, *Chabertia ovina*, *Dictyocaulus filaria*, *Gongylonema pulchrum*, *Marshallagia marshalli*, *Nematodirus abnormalis*, *N. oiratianus*, *N. spathiger*, *Ostertagia occidentalis*, *O. trifida*, *Setaria* sp., *S. labiato-papillosa*, *S. mugani*, *S. transcaucasica*, *Skrjabinema ovis*, *Trichuris skrjabini*, *T. ovis*, *T. capricola*, *T. colubriformis*, *T. probolurus* and *T. vitrinus*. The extensivities and intensities of these infections are tabulated. G. I. Pozniak

1804—DOLLFUS, R. P. & SAINT GIRONS, M. C., 1959. "Addendum à 'Modifications du comportement d'un *Apodemus* parasité par des cystiques polycéphales, en relation avec la croissance de ceux-ci'." *Vie et Milieu. Paris*, **10** (4), 421–422.

Dollfus & Saint Girons referring to a previous note [for abstract see Helm. Abs., **27**, No. 313a], state that they omitted to mention the polyecephalous cyst with 12 heads found by Mahon in a *Mus musculus* from the Belgian Congo [for abstract see Helm. Abs., **23**, No. 565a]. The relationships and identity of this cyst are discussed in the light of their own findings and those of other workers. N. Jones

1805—GEMMELL, M. A., 1959. [Hydatid Research Unit, University of Otago Medical School, Dunedin, New Zealand.] "The fox as a definitive host of *Echinococcus* and its role in the spread of hydatid disease." *Bulletin of the World Health Organization*, **20** (1), 87–99. [French summary pp. 98–99.]

Gemmell presents a review of the literature pertaining to the role of the fox in the epidemiology of hydatid disease. On the basis of natural and experimental infections, the author states that the European red fox (*Vulpes vulpes*) is not a suitable definitive host for *Echinococcus granulosus*. Although a low grade infection with the Australian strain of *E. granulosus* was experimentally established in foxes, growth did not proceed beyond two segments, and the worms did not develop to sexual maturity even after a period of 112 days. The author states that the fox is not important in the spread of hydatid caused by *E. granulosus* in Australia. Two theories are proposed to explain the occurrence of alveolar echinococcosis outside of its endemic regions. The importation of dogs harbouring *E. multilocularis* is suggested as one source. However, in the two cases reported from Australasia, unilocular cysts were found in association with the alveolar lesions. Furthermore, since these alveolar lesions did not present the typical picture of alveolar hydatid as described by Dévé, Gemmell postulates that *E. granulosus*, by pleomorphism in its cystic stage, may result in atypical or pseudo-alveolar cases in man. G. A. Webster

1806—GILMORE, R. E., & ALLEN, R. W., 1960. [Animal Disease and Parasite Division, Agricultural Research Service, U.S. Department of Agriculture, University Park, New Mexico, U.S.A.] "Helminth parasites of pronghorn antelope (*Antilocapra americana*) in New Mexico with new host records." *Proceedings of the Helminthological Society of Washington*, **27** (1), 69–73.

Gilmore & Allen report on the parasites found in 18 antelope (*Antilocapra americana*) from New Mexico. All harboured helminths, the two commonest being *Nematodirella longispiculata* and *Pseudostertagia bullosa*. The remaining ten species were: *Moniezia expansa*, *Thysanosoma actinioides*, *Trichostrongylus axei*, *T. colubriformis*, *Cooperia oncophora*, *C. pectinata*, *C. punctata* (the two last species being new host records), *Ostertagia ostertagi*, *Nematodirus lanceolatus* and *Haemonchus placei* (the two last species identifications being tentative). *N. lanceolatus*, if the identification is correct, is reported for the first time in the U.S.A. W. G. Inglis

1807—IVASHKIN, V. M., 1958. [Gelmintologicheskaya Laboratoriya, Akademiya Nauk SSSR, Moscow.] "La parabronématose une nouvelle helminthose des ruminants. Epizootologie, prophylaxie, élucidation du cycle évolutif de son agent." **Bulletin de l'Office International des Épizooties**, 49 bis (11/12), 353–360. [Also in English pp. 361–367.]

Ivashkin reports on the infection of ruminants with *Parabronema skrjabini*. The paper describes the life-cycle of the parasite, the epizootiology of the disease in ruminants and its diagnosis, therapy and prophylaxis. [See also Helm. Abs., 29, No. 1385.] N. Jones

1808—WARD, J. W. & COLLINS, R. A., 1959. "The occurrence of *Diphyllbothrium stemmacephalum* Cobbold, 1858, from the dolphin, *Tursiops truncatus*, of the Biloxi, Mississippi, Bay." [Abstract.] **Journal of Parasitology**, 45 (4, Sect. 2), 40.

Three specimens of *Diphyllbothrium stemmacephalum*, without scoleces, were recorded from a porpoise, *Tursiops truncatus*. Dimensions of segments and a brief description are given. N. A. Hancock

1809—WYSOCKI, E. & NASIŁOWSKA, M., 1959. [Laboratorium Technologiczne DDD, Ministerstwo Zdrowia, Warszawa, Poland.] "Wyniki badań nad helmintofauną szczurów wędrownych." **Wiadomości Parazytologiczne. Warsaw**, 5 (6), 591–594. [English summary p. 594.]

Wysocki & Nasiłowska examined 150 *Rattus norvegicus*, caught in Warsaw and its suburbs, from July 1957 to December 1958. The following helminths were found: *Hymenolepis fraterna*, *H. diminuta*, *Cysticercus fasciolaris*, *Taenia taeniaeformis*, *Ganguleterakis spumosa*, *Trichinella spiralis* and *Trichosomoides crassicauda*. The authors conclude that the incidence of infection in rats in Warsaw has risen since the work of Obitz in 1933 as follows: with *H. fraterna* from 30% to 50%, with *H. diminuta* from 13% to 16% and with *Trichosomoides crassicauda* from 58% to 74%. N. Jones

Other Birds

See also Nos.: 1959, 1963, 1966, 1975, 1981, 1996, 2002, 2026, 2088, 2089, 2121, 2138, 2143, 2150.

1810—BARRY, M. R., 1959. [P.O. Box 72, Albury, New South Wales, Australia.] "Flukes in the respiratory tract of ducks." [Correspondence.] **Australian Veterinary Journal**, 35 (9), 432.

Infection with the monostome fluke *Tracheophilis cymbius* (Diesing, 1850), normally a parasite of water-birds, was observed post-mortem in Muscovy ducklings. These birds had access to a swamp frequented by wild water-birds. The intermediate host is not recorded although large numbers of the bulinoid snail *Lenameria tenuistriata* were observed in the swamp. 5 gm. hexachlorethane given in the mash on two days resulted in satisfactory improvement. R. F. Riek

1811—KASIMOV, G. B., 1960. [The helminth fauna of birds of the family Numididae, Order Galliformes.] **Dokladi Akademii Nauk Azerbaidzhanskoi SSR.**, 16 (3), 303–305. [In Russian.]

Kasimov lists 29 cestodes, 21 nematodes, 5 trematodes and 5 acanthocephalans from seven species of Numididae. 25 of the helminths were represented in his own collection from five wild species of numidid birds. He analyses the fauna in respect of its character and host specificity. G. I. Pozniak

1812—ODETOYINBO, J. A. & ULMER, M. J., 1959. "Studies on avian filarial worms of the sub-family Splendidofiliariinae (Nematoda: Dipetalonematidae)." [Abstract.] **Journal of Parasitology**, 45 (4, Sect. 2), 58.

The authors have examined 62 bronzed grackles (*Quiscalus quiscula versicolor*) from Iowa. Dipetalonematid worms of two species were found. Adults in number from 3 to 32 invariably inhabit the cerebral hemispheres. The common microfilariae are sheathed and blunt at both ends; the less common are also sheathed but pointed posteriorly. In the case of the commoner microfilariae, experiments show a definite increase in number in the peripheral blood between 8 p.m. and 6 a.m. Living microfilariae are recovered from clotted heart blood of refrigerated birds seven days after death; living adults from the brain have been recovered three days after death. W. M. Fitzsimmons

- 1813**—RICO, C. M. & VITA, L. A., 1959. "Experiencias hidáticas en aves carnívoras y omnívoras." **International Veterinary Congress (16th), Madrid**, May 21–27, 1959. Vol. II, pp. 717–721.
The absence of dogs and the simultaneous frequency of hydatid disease in some localities made the authors suspect birds of prey and omnivorous birds as definitive hosts of *Echinococcus granulosus*. About 200 of these birds in the zoological garden of Cordoba, belonging to 22 species, were fed with viscera containing hydatid cysts and given hydatid fluid to drink. Extensive coprological and post-mortem examinations failed to reveal any infection resulting from this experiment. It is concluded, therefore, that birds do not provide favourable conditions for the survival of *E. granulosus* because of the high body temperature and faecal acidity. N. Jones

Reptiles and Amphibia

See also Nos.: 1963, 1965, 1991, 1996, 1997, 2007, 2084, 2093, 2113, 2118, 2133, 2137, 2148, 2150, 2152.

- 1814**—LEHMANN, D. L., 1960. [Department of Zoology, College of the Pacific, Stockton, California, U.S.A.] "Some parasites of central California amphibians." **Journal of Parasitology**, **46** (1), 10. Five species of trematode, two of cestode and two of nematode, collected from seven species of Urodela and three of Salientia in California, are listed with their hosts. The following new host records are made: *Glythelminis californiensis*, *Haematoloechus* sp. and *Megalodiscus temperatus* in *Rana boylii*; *Bothriocephalus rarus* in *Taricha torosa*; *M. americanus* and *Rhabdias* sp. in *Dicamptodon ensatus*; and *Oxyuris dubia* in *D. ensatus*, *Aneides flavipunctatus* and *A. lugubris*. [This research note is an addition to the author's paper published in 1954. For abstract see Helm. Abs., **23**, No. 31s.] G. I. Pozniak

Miscellaneous

See also Nos.: 2035, 2036, 2037, 2046, 2052, 2054, 2063, 2070, 2072, 2079, 2165, 2167, 2189, 2248, 2261, 2292, 2296, 2301, 2308, 2311, 2314, 2326.

- 1815**—ABDEL MALEK, E., 1959. [University of Khartoum, Sudan.] "Trematode infections in some domesticated animals in the Sudan." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 21. *Fasciola gigantica*, *Paramphistomum microbothrium* and *Cotylophoron cotylophorum* were collected from cattle, sheep and goats, *Schistosoma bovis* from cattle, sheep, horses, camels and pigs, and *Gastrodiscus aegyptiacus* from equines. Colonies of *Lymnaea natalensis* were found to build up in October and November in the White Nile reservoir and infected snails and metacercariae of *F. gigantica* were met with in December, the peak of infection occurring in February, March and April. *Bulinus truncatus* and *B. (Physopsis) ugandae* were found naturally infected with *S. bovis* at an infection rate of 0.1% in November, December and January as compared with 42.1% for *P. microbothrium*, both rates rising in March. N. A. Hancock

- 1816**—ANON., 1957. "The menace of liver fluke." **Monthly Agricultural Report. Ministry of Agriculture, Northern Ireland**, **32** (5), 130–133.

In this article it is stated that of all cattle and sheep slaughtered in 17 provincial abattoirs in Northern Ireland during 1956, 72.2% of the cattle and 15% of the sheep harboured liver-flukes. It is also stated that 46.7% of the adult sheep were infected as compared with 8.2% of the lambs. C. Hatch

- 1817**—ANON., 1959. "Parasitic worm diseases of farm livestock." **Leaflet. Ministry of Agriculture, Northern Ireland**, No. 91, 6 pp.

In this leaflet the following examples of parasitic infections of farm stock are mentioned: strongylosis in horses; hoose, stomach and intestinal worms and liver-flukes in cattle; stomach and intestinal worms, liver-flukes and lungworms in sheep; ascarids in pigs; and

roundworms, caecal worms and tapeworms in poultry. A brief, general outline of the life-history and habits of helminths and the control and symptoms of parasitic infections is given and also advice on the treatment of stomach and intestinal worms of cattle and sheep, of redworms in horses, of ascarids in pigs and of roundworms and tapeworms in poultry.

C. Hatch

1818—ANTIPIN, D. N., 1958. "La lutte contre les helminthiases des animaux de ferme." *Bulletin de l'Office International des Épizooties*, 49 bis (11/12), 649–656. [Also in English pp. 657–664.] Antipin, in his discussion of helminthological work carried out in the U.S.S.R., briefly reviews the methods of diagnosis and of control of helminthiases in farm animals. N. Jones

1819—BABJANSKAS, N. A., 1958. "Distomatose des animaux de la ferme en Lithuanie et prophylaxie." *Bulletin de l'Office International des Épizooties*, 49 bis (11/12), 647–648.

It has been noted in the course of comparative studies of methods of diagnosis of distomiasis that serological diagnosis by the method of Leikina was more efficient than the intradermal reaction. Treatment of domestic animals in Lithuania against distomiasis twice a year did not bring about expected results. On the other hand, subsequent systematic control, comprising such measures as early immuno-biological diagnosis and treatment and pasture rotation has given good results.

N. Jones

1820—BOEV, S. N., 1959. "Lung helminthoses of domestic ruminants in the USSR." *International Veterinary Congress (16th), Madrid*, May 21–27, 1959. Vol. II, pp. 575–577.

Boev, in his brief survey of lung helminthiases in domestic ruminants in the U.S.S.R., refers particularly to distribution, epidemiology, symptomatology and control.

N. Jones

1821—BOEV, S. N. & ORLOV, N. P., 1958. "Les maladies parasitaires des animaux d'élevage au Kazakhstan et les moyens permettant de les combattre." *Bulletin de l'Office International des Épizooties*, 49 bis (11/12), 187–205. [Also in English pp. 206–222.]

The plan for controlling parasitic diseases of live-stock in Kazakhstan consists of three stages, namely, (i) controlling the death rate, mainly by mass treatments, (ii) control of subclinical forms of the diseases and (iii) complete eradication of the pathogenic agents. Up to the present the control of different helminthiases has been in either of the first two stages. Mortality due to helminthiases is greatest among sheep and goats (94.3% of the mortality of domestic animals). The authors go on to review the use and efficacy of some anthelmintics such as copper sulphate solution, amino-acrichin and tin arsenate, and quote literature on the life-cycle of some parasites and the distribution and control of certain helminthiases.

N. Jones

1822—BOUVIER, G., BURGISSER, H. & SCHNEIDER, P. A., 1959. [Service vétérinaire cantonal et Institut Galli-Valerio, Lausanne, Switzerland.] "Observations sur les maladies du gibier, des oiseaux et des poissons faites en 1957 et en 1958." *Schweizer Archiv für Tierheilkunde*, 101 (7), 340–349.

Bouvier *et al.* examined, during 1957–58, a total of 777 mammals, birds and fish, alive or dead; some were imported. Gastro-intestinal and pulmonary strongyloses were found in ibex. One of three marmots was found to be infected with *Ctenotaenia marmottae* and another had generalized cysticerciasis due to *Taenia crassipes* [*crassiceps*] infection. *Capillaria* were found very frequently in pheasants. Amongst 63 fishes of various species, *Gyrodactylus* infection was found once; unidentified cestodes occurred in pike, *Triaenophorus nodulosus* was an important cause of death in perch, and goldfish were found to be attacked by *Piscicola geometra*.

N. Jones

1823—CHENGÉ, P., 1958. [Département Vétérinaire, Ministère de l'Agriculture, République Populaire de Mongolie.] "Les services vétérinaires de la République Populaire de Mongolie et les maladies parasitaires du bétail." *Bulletin de l'Office International des Épizooties*, 49 bis (11/12), 463–472.

Chengé, after briefly reviewing the history of veterinary services of the Mongolian People's Republic, reviews the work concerning parasitic diseases of domestic animals in the country. Of these helminthiases are amongst the most important, especially cysticerciasis, hydatid

disease, coenuriasis, trichostrongyles (*Haemonchus*, *Ostertagia*, *Marshallagia*) and thelaziasis. The author goes on to discuss the distribution of the most important parasitic diseases, their control and treatment. N. Jones

1824—DALLING, T., 1960. "Parasitic infestations—how to check them?" *Indian Farming*, **10** (1), 14–18.

1825—FIENNES, R. N. T. W., 1959. [Zoological Society of London, Regent's Park, London, N.W.1.] "Report of the Society's Pathologist for the year 1957." *Proceedings of the Zoological Society of London*, **132** (1), 129–146.

The majority of laboratory investigations consisted of the examination of faeces for worms or worm eggs. Appendix 1 of the report lists the genera of parasites diagnosed in this way under hosts. Nematode and cestode infections continue to be troublesome in spite of treatment except among snakes in which mortality from nematode (and amoeba) infections has been reduced to negligible proportions. Research showed mortality of snakes to be due to inanition and anaemia associated with, *inter alia*, nematode infection especially *Polydelphis anoura* in the stomach and proximal duodenum. The *Polydelphis* gnaws through the mucous membrane and muscular layers of the stomach causing abscesses which separate these layers. Diagnosis is made by finding the ova in the faeces. Treatment [with one or two tablets of piperazine inserted into the food] was necessary over several months to clear the infection. *Rhabdias* was frequently observed to be associated with the presence of pus in the lungs of snakes but there appeared to be a marked improvement in this condition following the treatment given for *Polydelphis* infection. W. M. Fitzsimmons

1826—GALUZO, I. G., 1958. [Académie des Sciences de la R.S.S. de Kazakhie, Institut de Zoologie, Alma-Ata, U.R.S.S.] "Les foyers naturels des maladies des animaux au Kazakhstan et dans les Républiques de l'Asie centrale soviétique." *Bulletin de l'Office International des Épipizooties*, **49** bis (11/12), 114–127. [Also in English pp. 128–141.]

Galuzo, in a report on the natural foci of parasitic diseases of domestic animals in Kazakhstan and in the Soviet Republics of central Asia, stresses the important role of wild animals as reservoirs of such diseases. Quoting the works of other authors such as Boev, Gvozdev, Panin etc., the author points out the role of wild ungulates and birds as reservoirs of helminthiasis in domestic animals and poultry. The role of rodents is also emphasized by quoting Iksanov (1954), who found *Dictyocaulus filaria* in marmots and gophers in Kirgizia. The author goes on to refer to the teaching of Pavlovski on the natural focal character of parasitic diseases. N. Jones

1827—GIBSON, T. E., 1959. [Central Veterinary Laboratory, Weybridge, U.K.] "The therapy of parasitic gastro-enteritis in sheep and cattle." *Veterinary Record*, **71** (45, Pt. 2), 1014–1017. [Discussion pp. 1021–1024.]

Parasitic gastro-enteritis is a complex of diseases—haemonchiasis, ostertagiasis, trichostrongylosis etc. and although mixed infections are usual, a single species sometimes predominates, e.g. in nematodiriasis. Therapy should be effective against a number of species but there are no anthelmintics which achieve this ideal. Complete elimination of worms may be undesirable if it interferes with immunity. The merits of phenothiazine are discussed with special reference to recent studies on particle size and purity. It remains the drug of choice for sheep in which toxicity is rare and wool staining has been overcome by the McMaster oesophageal tube. More limited anthelmintic range and greater toxic hazards restrict its use for cattle. Other anthelmintics discussed are toluene, 1:8dihydroxyanthraquinone, piperazines, organic phosphorus compounds and bephenium compounds (special use against *Nematodirus* spp.). The "strategic" and "tactical" application of anthelmintics is discussed with notes on the particular merits of small daily doses of phenothiazine in preventing the building up of parasite populations. Topics discussed included acute outbreaks of parasitic disease, alternation of anthelmintics, phenothiazine (tablets versus drenches, possible toxicity of fine-particle material, inadequate doses and variable efficiency) and injuries from drenching implements. H. McL. Gordon

1828—GIBSON, T. G. E., 1959. "Helminthiasis in Somaliland Protectorate." **Bulletin of Epizootic Diseases of Africa**, 7 (4), 355–356. [French summary p. 356.]

Gibson states that helminthiasis, although known to occur for many years, has not until recently been recognized by the Somali stock-owners as economically important. However, due to bad grazing conditions causing a high death rate during the winter of 1958–59, anthelmintic treatment became essential. Because phenothiazine supplies were severely restricted for financial reasons, copper sulphate was used alone. 120 gm. were dissolved in 12 litres of water; sheep and goats were given an average of 60 c.c. depending on condition, weight and age. 150,000 head were treated and there was an immediate drop in the death rate and an improvement in condition. Faecal examination revealed very heavy worm infection, principally with *Trichostrongylus* spp. The incidence of helminthiasis in cattle and camels is stated to be low, but in equines and local species of gazelle it seems to be high. G. Froyd

1829—ITAGAKI, S. & ISHIHARA, T., 1958. [Azabu Veterinary College, Japan.] "La filariose chez les animaux domestiques au Japon." **Bulletin de l'Office International des Épidémiologies**, 49 bis, (11/12), 526–537. [Also in English pp. 538–549.]

Lumbar paralysis of sheep, goats and horses in Japan, due to *Setaria cervi* infection, is of seasonal character and appears at the end of the summer and in the autumn on low ground adjoining rice fields and marshes. This disease does not occur in the cold northern districts or on dry soils as in Hokkaido. The authors review the literature on "Kasen" disease of horses when discussing its aetiology, treatment and prevention. N. Jones

1830—KIM JYONG HI, 1958. "The list of parasites arranged by each domestic animal which were recorded in Korea." **Bulletin de l'Office International des Épidémiologies**, 49 bis (11/12), 618–632.

A list of parasites of cattle, horses, pigs, sheep and goats, chickens, rabbits, dogs and cats in Korea is given. The list comprises 20 species of cestodes, 14 species of trematodes and 57 species of nematodes. [A fuller account of this article appeared in "Parasites of domestic animals in Korea" by Kim Jyong Hi, published in Pyongyang by the National Publishing Bureau of Agriculture in 1958.] N. Jones

1831—KOPIRIN, 1958. [Institut de Recherches Vétérinaires de Sibirie.] "Travaux de recherches sur les helminthes et les helminthoses des animaux domestiques en Sibirie." **Bulletin de l'Office International des Épidémiologies**, 49 bis (11/12), 665.

Kopirin gives a brief account of the activities of the Zonal Institute of Research in Omsk. The method of preparation of a new biological product, "opistorchine" for serological diagnosis of pistorchiasis in man and in carnivores, was devised by Rodomanovskaya, a scientific collaborator of the Institute. The product proved to be highly specific and allowed diagnosis even of light infections. N. Jones

1832—KREIS, H. A., 1960. [Bern, Königstrasse 40, Switzerland.] "Parasitische Würmer aus süd-amerikanischen Haustieren (Beiträge zur Kenntnis parasitischer Nematoden. XXII)." **Zeitschrift für Parasitenkunde**, 20 (1), 23–134.

Kreis gives redescrptions of the following helminth parasites of domestic animals in South America together with information on their pathogenicity, distribution, treatment, etc. Nematoda—*Trichuris ovis*, *Strongylus equinus*, *S. vulgaris*, *S. edentatus*, *Stephanurus dentatus*, *Cyathostomum coronatum*, *Cylicocercus catinatus*, *Oesophagostomum venulosum*, *Chabertia ovina*, *Ancylostoma caninum*, *Bunostomum phlebotomum*, *Haemonchus contortus*, *Trichostrongylus axei*, *Ostertagia ostertagi*, *Cooperia oncophora*, *C. pectinata*, *Nematodirus filicollis*, *Dictyocaulus viviparus*, *Oxyuris equi*, *Heterakis gallinarum*, *Ascaris lumbricoides*, *Toxocara canis*, *T. mystax*, *Ascaridia lineata*, *Setaria cervi*; Acanthocephala—*Macracanthorhynchus hirudinaceus*, *Oncicola canis*; Trematoda—*Fasciola hepatica*; Cestoda—*Moniezia expansa*, *Raillietina tetragona* and *R. echinobothrida*. W. G. Inglis

1833—KURTPINAR, H., 1958. "Les maladies parasitaires des animaux domestiques en Turquie et les moyens de lutte contre elles." **Bulletin de l'Office International des Épidémiologies**, 49 bis (11/12), 568–585.

Kurtpinar, after a short introductory note, gives a general account of parasitic diseases of domestic animals and fowl in Turkey. The list of parasites includes 14 species of cestodes, 4 species of trematodes and 64 nematode species. N. Jones

1834—LANCASTER, W. E., 1957. "A check list of helminths of domestic livestock in Malaya." *Journal of the Malayan Veterinary Medical Association*, 1 (4), 151-163.

1835—LUIGI, L. & VICENZO, M., 1959. "Die Trichinose in Italien." *International Veterinary Congress (16th), Madrid*, May 21-27, 1959. Vol. II, pp. 727-728.

Luigi & Vincenzo give a brief review of the literature on trichinellosis in Italy since 1864 and conclude that this infection is rare, both in man and in pigs. Of 1,284 animals susceptible to trichinellosis (rats, dogs, cats, moles and foxes) examined in northern Italy during 1957-58, only foxes (32.8% of 594) were found to be infected. Later the authors examined the diaphragm pillars and, in many cases, also other muscles at post-mortem examinations of 512 persons. The resulting incidence of human trichinellosis, statistically estimated for the whole country, was found to be 0.897%.

N. Jones

1836—MARZULLO, F., SQUADRINI, F. & TAPARELLI, F., 1957. [Clinica delle Malattie Infettive e Tropicali, Università di Modena, Italy.] "Sul parassitismo delle vie biliari extraepatiche. Nota 1. Osservazioni su 100 colecisti bovine e 100 colecisti suine." *Bollettino della Società Medico-Chirurgica di Modena*, 57 (4), 321-326.

Eggs of *Dicrocoelium dendriticum* were found in 27 of 100 bovine gall-bladders examined, those of *Fasciola hepatica* in 22% of these organs. Examination of gall-bladders from 50 pigs, obtained from a private abattoir, gave negative results. On the other hand, helminth eggs were found in 32% of 50 pigs which came from private (individual) owners.

N. Jones

1837—OKOSHI, S., 1958. [Department of Veterinary Medicine, Faculty of Agriculture, University of Tokyo.] "La schistosomiase japonaise chez les animaux domestiques." *Bulletin de l'Office International des Épidémiologies*, 49 bis (11/12), 586-592. [Also in English pp. 593-599.]

Okoshi reviews some literature on *Schistosoma japonicum* infection in Japan, discusses the epidemiology of the disease, gives some examples of its incidence and evolution as influenced by control, and goes on to discuss treatment and prophylaxis.

N. Jones

1838—OKOSHI, S., 1959. [Department of Veterinary Medicine, Faculty of Agriculture, University of Tokyo, Tokyo, Japan.] "Studies on schistosomiasis japonica in domestic animals in Japan." *International Veterinary Congress (16th), Madrid*, May 21-28, 1959. Vol. II, pp. 729-730.

Okoshi relates that *Schistosoma japonicum* has become enzootic only in some regions in Japan which offer favourable conditions for *Oncomelania nosophora* and that cattle and dogs are the animals most affected. He gives a very brief account of the seasonal occurrence of this infection, its mass diagnosis and treatment in Japan.

G. I. Pozniak

1839—ONO, Y., 1958. [Collège d'Agriculture de Hyogo, Sasayama-machi, Japan.] "Infestation des ruminants par la doudou." *Bulletin de l'Office International des Épidémiologies*, 49 bis (11/12), 550-554. [Also in English pp. 555-559.]

Ono gives a general account of *Fasciola hepatica* infection in ruminants in Japan. This infection is very frequent in the country and it is estimated that some 40% of the cattle and 15% of sheep and goats are affected.

N. Jones

1840—PERUMAL PILLAI, C. & SHOHO, C., 1959. [Faculty of Veterinary Science, University of Khartoum, Sudan.] "Difficulties of control of cerebro-spinal nematodiasis (due to immature *Setaria digitata*) of goats and horses under tropical conditions." *International Veterinary Congress (16th), Madrid*, May 21-27, 1959. Vol. II, pp. 587-589.

Perumal Pillai & Shoho review the literature on cerebrospinal nematodiasis of sheep, goats and horses in Ceylon and Japan, due to immature *Setaria digitata* infection. Because of climatic and other conditions its control is more difficult in Ceylon than in Japan. The authors then discuss the epidemiology and prophylaxis of the infection. They conclude that, for Ceylon and other tropical countries with similar conditions, the best control of this infection in goats will be achieved by selective breeding of resistant hosts.

N. Jones

- 1841**—POLJAKOW, A. A. & KOLOBLOZKI, G. W., 1959. [Das wissenschaftliche Alunionsforschungsinstitut für tierärztliche Sanitarie, Moscow, S.S.S.R.] "Über die Bedeutung der Parasiten in der tierärztlichen Fleisch- und Fischsanitäts Expertise." **International Veterinary Congress (16th), Madrid**, May 21–27, 1959. Vol. I, pp. 353–362.

In the U.S.S.R. it is planned to eradicate helminth infections in the near future. The paper gives a brief review of the organization of sanitary and veterinary (including meat inspection) services, and the present distribution of, and the scientific and practical work done towards, the control of trichinellosis, cysticerciasis, echinococcosis, fascioliasis, diphyllobothriasis and opisthorchiasis.

G. I. Pozniak

- 1842**—SAITO, K., 1958. "Principaux endoparasites des animaux domestiques au Japon." **Bulletin de l'Office International des Épidémiologies**, 49 bis (11/12), 600–608. [Also in English pp. 609–617.]

Saito enumerates the principal helminthiasis of domestic animals in Japan and briefly discusses their treatment. These are: in horses, ascariasis, strongylosis and habronemiasis; in cattle, fascioliasis, schistosomiasis, monieziasis and *Onchocerca gutturosa* infection (Wahi); in pigs, *Ascaris suum*, *Strongyloides ransomi*, *Trichuris suis*, *Oesophagostomum dentatum* and *Metastrongylus elongatus* infections; in sheep and goats, haemonchiasis, oesophagostomiasis, trichostrongylosis, monieziasis, cerebrospinal filariasis (*Setaria digitata* infection) and fascioliasis. Only a few cases of hydatid disease have been reported from animals since 1893, but 93 human cases have been recorded. The common helminths of chickens are *Ascaridia galli*, *Raillietina* spp., *Heterakis gallinae* and *Capillaria* sp.

N. Jones

- 1843**—SCHOTT, G., 1960. [Institut für Parasitologie, Veterinärmedizinische Fakultät der Freien Universität, Berlin.] "Koprologische Untersuchungen auf Darmnematoden bei Tieren des Zoologischen Gartens Berlin." **Berliner und Münchener Tierärztliche Wochenschrift**, 73 (9), 165–166.

At the Berlin Zoological Gardens, regular faecal examinations of animals have been made since 1957 in order to detect carriers of intestinal nematodes and, by subsequent measures, to reduce the prevalence of these infections. The species encountered in various monkeys, ruminants, pigs, equines, carnivores, other animals and birds are briefly noted.

G. I. Pozniak

- 1844**—SERRES, J. R., 1959. "La profilaxis de la equinocosis—hidatidosis en países de producción ganadera extensiva." **International Veterinary Congress (16th), Madrid**, May 21–27, 1959. Vol. II, pp. 723–725.

Serres summarizes the problems involved in the prophylaxis of hydatidosis in countries where domestic animals are extensively bred. Control measures are proposed.

N. Jones

- 1845**—SHOHO, C., 1959. [Nakayama-Soen, Takarasuska, Hyogo-Ken, Japan.] "Sur les filaires chez les équidés et les bovidés." **Revue d'Élevage et de Médecine Vétérinaire des Pays Tropicaux**, 12 (1), 43–52. [English & Spanish summaries p. 52.]

In spite of the distinction which exists in Japan between ocular and nervous forms of the disease due to infection by immature *Setaria*, especially in horses, Shoho believes that filariae reach the eye via the optical fissure from the brain cavity. In fact, some cases were observed where ocular symptoms were preceded by nervous symptoms. *S. equina* microfilariae were very rarely found in the eyes of horses in Japan, most of those so located apparently being *S. digitata*. After examining some European microfilariae from bovine eyes and finding them to be *S. digitata*, the author suggests that, since adults of this species cannot be found in bovines in Europe, *S. labiato-papillosa* could assume the form of *S. digitata* and vice versa. Examination of five adult *Setaria* from European bovines showed them to be *S. labiato-papillosa*. The paper is illustrated with numerous photomicrographs and diagrams.

N. Jones

- 1846**—SHOHO, C., 1960. [University of Khartoum, Sudan.] "Studies of cerebrospinal nematodiasis in Ceylon. (VIII). Occurrence of cerebrospinal nematodiasis of goats and horses in Ceylon. A comparative study with those of sheep, goats and horses (foals) in Japan and the significance of histopathological diagnosis." **Ceylon Veterinary Journal**, 8 (1), 13–16.

Shoho lists 25 goats and 3 horses, attended by him for cerebrospinal nematodiasis, under places of their occurrence in Ceylon and discusses some of the factors influencing occurrence

such as climatic conditions, presence of susceptible animals and behaviour of the insect intermediary. He compares these factors and the state of infection with that in Japan, where diagnosis of this infection is made difficult through the presence, particularly in foals, of *B. encephalitis* virus, which produces a similar disease syndrome. G. I. Pozniak

- 1847—SHULTS, R. S. & BONDAREVA, V. I., 1958. [Scientific Research Veterinary Institute, Alma-Ata, U.S.S.R.] "Organisation de la lutte contre la coenurose et l'échinococcose au Kazakhstan." **Bulletin de l'Office International des Épizooties**, 49 bis (11/12), 313–323. [Also in English pp. 324–334.]

Due to differing natural and economic conditions the distribution of hydatid and coenuriasis in the southern part of Kazakhstan is more or less even but in the northern part it is mosaic in pattern. In the south, because of seasonal grazing, the main infection occurs in the spring and autumn, whereas in the north it occurs throughout the entire grazing period. The authors then discuss *Coenurus* infection in sheep, as influenced by age immunity and allergic reactions as a means of diagnosing coenuriasis, hydatid disease and cysticerciasis. The measures taken against hydatid and coenuriasis are: (i) timely isolation of animals with *Coenurus*; (ii) further improvement of the veterinary sanitary service on farms; (iii) regular worming of dogs; (iv) propaganda. N. Jones

- 1848—SOFIEV, B. I., 1958. [Chief of the Veterinary Administration of the Ministry of Agriculture of the Kazakh S.S.R., Alma-Ata, U.S.S.R.] "Prophylaxie des maladies parasitaires des animaux de ferme au Kazakhstan." **Bulletin de l'Office International des Épizooties**, 49 bis (11/12), 171–178. [Also in English pp. 179–186.]

Sofiev, after briefly reviewing the history of helminthology in Kazakhstan, reports on progress in the control of helminthiasis in the Republic. Intratracheal injections of iodine and use of phenothiazine in salt greatly reduced the incidence of dictyocauliasis in sheep and mortality due to this disease. The use of phenothiazine with salt also gave good results in the control of haemonchiasis. Monieziasis has been successfully controlled with copper sulphate solution. Simple surgical intervention was successful in up to 70% of cases in the treatment of coenuriasis. N. Jones

- 1849—VITTOZ, R., 1958. "Rapport de la Conférence Régionale sur les Maladies Parasitaires des Animaux en Asie, tenue à Alma-Ata, Kazakhstan (U.R.S.S.) du 31 mai au 7 juin 1958." **Bulletin de l'Office International des Épizooties**, 49 bis (11/12), 1–67.

Vittoz reports on the Regional Conference of the Office International d'Épizooties on the parasitic diseases of animals in Asia which took place in Alma-Ata in 1958. The following countries were represented at the conference: Cambodia, Democratic People's Republic of Korea, Indonesia, Japan, Democratic People's Republic of Mongolia, Pakistan, United Arab Republic, U.S.S.R., and Democratic Republic of Viet Nam. After briefly outlining some geographical and agricultural aspects of the Kazakhstan S.S.R., the author reports on the time-table of the conference which comprised visiting co-operative farms, receptions, etc. The conference was opened by the vice-minister of Agriculture of the Kazakhstan S.S.R., Doulenov. Academician K. I. Skryabin was elected as the honorary chairman and Dr. A. A. Boiko, the head of the Principal Section of Veterinary Services of the U.S.S.R.—as the active chairman of the conference. [Reports made by different authors will be abstracted separately.] N. Jones

- 1850—WATANABE, S., 1958. [Central Laboratory, National Institute of Animal Health, Kodaira, Tokyo, Japan.] [General review on fascioliasis hepatica in Japan.] **Journal of the Japan Veterinary Medical Association**, 11 (7), 293–299. [In Japanese.]

Using his own data as well as that of other workers, Watanabe reviews the diagnosis, therapy, mode of infection and prevention of fascioliasis in Japan. He states also that liver-flukes which could be identified as *Fasciola hepatica* were not often seen. The rest should be classified as either *F. gigantica* or an intermediate form of *F. gigantica* and *F. hepatica*. The existence of *F. indica* also seemed probable. Y. Yamao

1851—WHITE, J. B., 1959. "The treatment of the debility associated with severe parasitism." **Veterinary Record**, 71 (45, Pt. 2), 1018–1021. [Discussion pp. 1021–1024.]

The causes of debility seen in parasitic diseases are discussed, with reference to loss of appetite, reduced absorption of nutrients and particularly anaemia, as a basis for the treatment which should supplement anthelmintics. In outbreaks a general appraisal should be made, to include clinical condition, age and type of animal, duration and nature of onset of disease, identification of parasites, number and grouping of animals affected, nutritional value of pastures (present and future) and availability of supplementary food. Treatments for diarrhoea, pulmonary disabilities accompanying husk (parasitic bronchitis) and anaemia are recommended. Topics discussed included blood transfusions, stress in parasitic diseases, and chronicity of infections with *Trichostrongylus axei*.
H. McL. Gordon

1852—YASIN, S. A. & ABDUSSALAM, M., 1958. "Récentes contributions à la parasitologie vétérinaire au Pakistan." **Bulletin de l'Office Internationale d'Épizooties**, 49 bis (11/12), 473–480. [Also in English pp. 481–492.]

Yasin & Abdussalam review the contributions made in veterinary parasitology after the establishment of the State of Pakistan, which relate mainly to helminths of ruminants especially *Dictyocaulus filaria*, schistosomes, *Fasciola* and trichostrongylids.
M. M. Sarwar

FISHERIES HELMINTHOLOGY

Fresh-Water Fisheries

See also Nos.: 1690, 1822, 1957, 1958, 1963, 1970, 1977, 1980, 2088, 2122, 2149, 2191.

1853—AGAPOVA, A. I., 1958. [Academy of Sciences of Kazakh S.S.R., Institute of Zoology, U.S.S.R.] "Parasites et maladies parasitaires des poissons au Kazakhstan." **Bulletin de l'Office International des Épizooties**, 49 bis (11/12), 335–343. [Also in English pp. 344–352.]

Agapova reviews work concerning parasites of fishes in Kazakhstan. Amongst other parasites have been recorded: 39 species of digenetic and 65 species of monogenetic trematodes, 18 species of cestodes, 18 species of nematodes 6 species of acanthocephalans and 5 species of Hirudinea. The author goes on to enumerate the most frequent parasites and their pathogenicity to the fish. Some features of control of fish parasites are also outlined, quoting experiments. [See also Helm. Abs., 26, No. 460a.]
N. Jones

1854—AZAMI, S., 1959. [Department of Public Health, School of Medicine, Kanazawa University, Kanazawa, Japan.] [Preliminary report on a strigeid metacercaria from *Ophicephalus argus* in Ishikawa Prefecture.] **Japanese Journal of Parasitology**, 8 (4), 523–526. [In Japanese: English summary p. 526.]

A metacercaria was found in the muscle of *Ophicephalus argus* caught in Ishikawa Prefecture, and was considered to belong to the genus *Neodiplostomum*. Mice, rats, ducks and dogs fed on the metacercariae did not become infected.
Y. Yamao

1855—DOLLFUS, R. P., 1959. "Sur un trématode (genre *Isoperorchis*), agent pathogène de la maladie de la 'tache d'encre' chez des poissons du Vietnam." **Bulletin de la Société de Pathologie Exotique**, 52 (6), 791–803. [Discussion p. 803.]

Tylosurus annulatus and *Ophicephalus striatus*, fish living in stagnant water and rice fields in Viet Nam, which suffered from "ink-spot" disease were found to be parasitized by *Isoperorchis trisimilitubis*; each spot was shown to be a reaction capsule containing the trematode. The parasites were also disseminated throughout the body. The life-cycle of the parasite is discussed.
W. K. Dunscombe

1856—MACKIEWICZ, J. S., 1959. "Fish hosts of the Caryophyllidea (Cestoda)." [Abstract.] **Journal of Parasitology**, 45 (4, Sect. 2), 25.

In the Nearctic region the main hosts are members of the Catostomidae, the Cyprinidae in the Palearctic region, and the Siluroidei in the Oriental, Ethiopian and Australasian regions. No

Caryophyllidea have been reported from the Neotropical region. A summary of fish hosts is given, arranged in Berg's system and order, with numbers of host genera and species.

N. A. Hancock

- 1857—NEBOLSINA, T. K., 1960. [Kaspiski nauchno-issledovatel'skiy institut morskogo ribnogo khozyaystva i okeanografii, U.S.S.R.] [Infection of young fish of the Caspian species of *Alosa* with the trematode *Mazocraes alosae*.] **Doklady Akademii Nauk SSSR**, 131 (6), 1478–1480. [In Russian.]

Nebolsina studied the incidence of infection of *Alosa caspica*, *A. volgensis*, *A. kessleri* and *A. brashnicovi* with *Mazocraes alosae*. All fish examined were less than one year old and were from the North Caspian Sea. The infection rate ranged from 17% to 69% in August and September of 1959 and in September the incidence was greater in all species except *A. volgensis*. It has been established that infection of *Alosa* species with this trematode takes place during the whole period they are in the North Caspian. Incidence was found to be higher among larger fish, except in *A. brashnicovi*, where it was in inverse proportion to the size of the fish. *M. alosae* is distributed throughout the entire North Caspian, but is more frequent in the western part.

N. Jones

- 1858—ROMANOVA, G. P., 1957. [Intestinal parasites of young *Lucioperca sandra* in the Rybinsk water reservoir.] **Doklady Akademii Nauk SSSR**, 117 (1), 157–160. [In Russian.]

In the Rybinsk water reservoir, young *Lucioperca sandra* were most frequently infected with juveniles of *Bunodera luciopercae* and *Camallanus* sp., occasionally with *Azygia lucii* and *Acanthocephalus lucii* and, very rarely, with some cestode larvae. The variations in infection in different sections of the reservoir and in the years 1953 and 1954 were studied. The most heavily infected with *B. luciopercae* were the fish feeding on crustacean plankton (predominantly Cladocera), indicating that some zooplankton species may serve as second intermediate hosts for this parasite.

G. I. Pozniak

Marine Fisheries

See also Nos.: 1971, 1974, 1978, 2138, 2206.

- 1859—DÍAZ DÍAZ, E., 1960. "Antocefalosis o vermes de la castañola." **Revista Ibérica de Parasitología**, 20 (1), 53–55.

Anthocephalus macrurus was found in the fish *Brama raii* at Valencia del Cid. M. McKenzie

- 1860—MCCAULEY, J. E., 1960. [Department of Zoology, Oregon State College, Corvallis, Oregon, U.S.A.] "Some hemiurid trematodes of Oregon marine fishes." **Journal of Parasitology**, 46 (1), 84–89.

McCauley reduces *Lecithochirium magnatesis* (Skryabin & Guschanskaya, 1955), *Adinosoma exodica* (Skryabin & Guschanskaya, 1955), and *Dissosaccus medius* (Skryabin & Guschanskaya, 1955) to synonymy with *L. exodicum* McFarlane, 1936. *Genolinea lintoni* Skryabin & Guschanskaya, 1954 is not considered to belong in that genus, thus is *incertae sedis*. *Tubulovesicula lindbergi* (Layman, 1930) Yamaguti, 1934 shows variations that reduce *T. spari*, *T. muraenosocis*, *T. californica*, *T. pseudorhombi*, *T. madurensis*, *T. nanaimoensis*, *Dinurus nanaimoensis*, *Lecithurus lindbergi*, and *Lecithaster lindbergi* to synonymy with it; a redescription of the species embracing the variations is given. New host and locality (Newport, Oregon) records reported are: *Derogenes crassus* from *Ophiodon elongatus* and *Sebastes paucispinus*; *D. varicus* from *Microgadus proximus*; *Genolinea laticauda* from *Leptocottus armatus*, *Enophrys bison* and *Blepsias cirrhosis*; *G. manteri* from *Lumpenus anguillaris* and *E. bison*; *G. montereyensis* from *Leptocottus armatus*; *Hemiurus levinsoni* from *Microgadus proximus*; *Lecithochirium exodicum* from *Ophiodon elongatus*; and *Tubulovesicula lindbergi* from eight species of fish.

E. I. Sillman

1861—RONALD, K., 1959. [Station de Biologie Marine, Grande-Rivière, Gaspé-Sud, Québec, Canada.] "A check list of the metazoan parasites of the Heterosomata." **Quebec: Department of Fisheries** (Contribution No. 67), 152 pp.

Ronald lists 121 species of the Heterosomata together with 392 records of Trematoda, Cestoda, Nematoda, Acanthocephala, Hirudinea, Copepoda and Isopoda from these flat-fishes. This is followed by a parasite-host list for each group of parasites. The arrangement of the fish species in the host list is based on classifications by Berg (1940), Gunther (1862), Jordan & Goss (1889), Jordan, Evermann & Clark (1930), Norman (1934) and Regan (1910). The order Heterosomata is subdivided into two suborders, Psettidoidea and Pleuronectoidea, the former including one family, the Psettodidae and the latter two superfamilies, the Pleuronectoidae and Soleoidae. The superfamilies are further subdivided into four families and eight subfamilies. As a result the host-parasite list of the Pleuronectoidea is divided into eight sections. One trematode, two cestodes, two copepods and one isopod are recorded for *Psettodes erumei*, the only species included in the Psettidoidea. The following records are given for the Pleuronectoidea: 152 Trematoda, 48 Cestoda, 63 Nematoda, 39 Acanthocephala, five Hirudinea, 65 Copepoda and 14 Isopoda. In the parasite-host list the species are recorded in alphabetical order together with bibliographic references to each record. 541 references are given in the bibliography.

H. H. Williams

1862—RONALD, K., 1960. [Department of Entomology and Zoology, Ontario Agricultural College, Guelph, Ontario, Canada.] "The metazoan parasites of the Heterosomata of the Gulf of St. Lawrence. V. Monogenea." **Canadian Journal of Zoology**, **38** (2), 243–247.

Ronald records two species of Monogenea from *Hippoglossus hippoglossus* and one from *Lepeophtheirus hippoglossi*, a copepod parasite of the halibut. 11 of 14 male *L. hippoglossi* each carried from 15 to 74 specimens of *Udonella caligorum* while 5 of 32 female specimens carried 8 to 26 on their ovisacs. From one to five *Entobdella hippoglossi* were found on 40% of the halibut examined and *E. curvunca* Ronald, 1957 is recorded [for abstract see Helm. Abs., **26**, No. 368b]. In a discussion of the incidence, distribution and host specificity of the halibut's Monogenea, Ronald states that this fish is parasitized by five genera in each of which there is no sharply defined host or even supra-specificity.

H. H. Williams

Miscellaneous

1863—HOFFMAN, G. L., 1959. [Eastern Fish Disease Laboratory, Leetown, (P.O. Kearneysville), West Virginia, U.S.A.] "Recommended treatment for fish parasite diseases." **Fishery Leaflet. Fish and Wildlife Service, Washington, D.C.**, No. 486, 4 pp.

Hoffman lists some methods recommended by various authors for treating external and internal parasites of fish. The helminths mentioned include monogenetic and digenetic trematodes, cestodes, nematodes and leeches.

I. L. Owen

NEMATOTOLOGY

Free-Living Nematoda

See also Nos.: 1703, 1899, 1982, 1984, 1987, 1995, 2009, 2050, 2061, 2068, 2175.

1864—STANKOVIĆ, S., 1960. "The Balkan Lake Ohrid and its living world." **Monographiae Biologicae. The Hague**, **9**, 357 pp.

Twenty-three species of nematodes have been found in Lake Ohrid mostly by W. Schneider (1943) of which four: *Punctodora ohridensis*, *Neochromadora trilineata*, *Ohridia bathybia* and *Theristus subsetosus* are endemic to the lake and were first found there. The origin and relationship of these species is discussed. Most of the nematodes inhabit the littoral zone, particularly the colonies of the sponge *Spongilla stankovici*. It is pointed out that the nematodes inhabiting the lake have not been sufficiently studied.

J. B. Goodey

Plant-Parasitic Nematoda

See also Nos.: 2000, 2001, 2003, 2008, 2013, 2042, 2047, 2048, 2049, 2050, 2055, 2061, 2064, 2065, 2067, 2068, 2069, 2094, 2110, 2114, 2145, 2153, 2154, 2155, 2157, 2160, 2162, 2168, 2170, 2175, 2177, 2178, 2179, 2184, 2185, 2186, 2195, 2202, 2210, 2227, 2235, 2236, 2243, 2244, 2255, 2257, 2316.

1865—ANON., 1959. "New plant diseases." *Agricultural Gazette of New South Wales*, **70** (12), 648–650.

During the year ending June 30th 1958 the following nematode attacks on plants were reported for the first time from New South Wales: *Meloidogyne hapla* on *Daucus carota* and *Pastinaca sativa*; *M. incognita* on *Symphytum officinale* and *Vigna vexillata*; *M. javanica* on *Ipomoea cairica*; *Meloidogyne* sp. on *Centaurea cineraria*, *Impatiens sultani* and *Senecio lautus*; and *Ditylenchus destructor* in mushroom compost. D. J. Hooper

1866—ANON., 1960. "New plant diseases." *Agricultural Gazette of New South Wales*, **71** (3), 156–157.

New plant diseases recorded in New South Wales in the year ending 30th June 1959 include: *Heterodera schachtii* on *Beta vulgaris* var. *cicla*, *Brassica napobrassica* (swede turnip) and *B. oleracea* var. *capitata*; *Meloidogyne incognita* on *Daucus carota*, *Phaseolus vulgaris* and *Vitis vinifera*; *M. incognita* var. *acrita* on *Olea europaea*; *M. javanica* on *Armoracia rusticana* and *Prunus domestica*; *Meloidogyne* sp. on *Gladiolus* sp. and *Holmskioldia sanguinea*. D. J. Hooper

1867—ANON., 1960. "Some records of nematodes encountered in Canada on native and imported plant material in 1959." *Canadian Insect Pest Review*, **37** (9), 295–297.

These records include *Meloidogyne hapla* on Japanese barberry and *Clematis tangutica*; *M. incognita* on fibrous begonia and hoyia; *Pratylenchus minyus* on white clover; *Tylenchorhynchus maximus* on wild iris, lucerne, oak seedlings and white clover; *T. brevidens* on lucerne, clover and white clover; *Gottholdsteinera goodeyi* on lucerne, ox-eye daisy and wild iris; *Scutellonema brachyurum* on hoyia; *Criconemoides lobatum* on lucerne and wild iris; *Criconema* sp. on African violet; *Paratylenchus macrophallus* on strawberry and ox-eye daisy; *Anguina* sp. on *Agropyron inerme* and red top grass; *Xiphinema americanum* on clover and lucerne. D. J. Hooper

1868—ARRUDA, H. V. DE, 1957. "Nematoides em cafézais de Ribeirão Preto." *Boletim da Superintendência dos Serviços do Café. São Paulo*, **32** (370), 21–24.

Arruda describes the symptoms of disease of coffee caused by *Meloidogyne exigua*, and its distribution in São Paulo, Brazil. General methods of control are mentioned. M. T. Franklin

1869—BAINES, R. C., BITTERS, W. P. & CLARKE, O. F., 1960. [University of California Citrus Experiment Station, Riverside, California.] "Susceptibility of some species and varieties of citrus and some other rutaceous plants to the citrus nematode." *Plant Disease Reporter*, **44** (4), 281–285.

Baines *et al.* sampled roots of trees growing in fields which had natural infestations of *Tylenchulus semi-penetrans*. Also seedlings were tested in infested soil in the green-house. They found that 23 named citrus species, 20 citrus hybrids and six non-citrus species were susceptible to *T. semi-penetrans*. 11 out of 12 varieties and species of *Poncirus trifoliata* were highly resistant as were also six other non-citrus species. The suitability of resistant plants for root stocks is considered. D. J. Hooper

1870—BAXTER, L. W. & GIBSON, P. B., 1959. [Department of Agriculture, Western Kentucky State College, Bowling Green, Kentucky, U.S.A.] "Effect of root-knot nematodes on persistence of white clover." *Agronomy Journal*, **51** (10), 603–604.

Ten clones of *Trifolium repens* were established in autumn in each of a number of small field plots of two soil types—sandy loam and sand. The following May the plots were inoculated with root-knot nematodes of one of the following species: *Meloidogyne arenaria*, *M. hapla*,

M. incognita, *M. incognita* var. *acrita* or *M. javanica*. Reduced stand and yellowing of the leaves were evident by July and the symptoms worsened during August; *M. hapla* plots showed least damage. There was recovery during the winter, except in the *M. hapla* plots, followed by decline in the second summer similar to that in the first. In the *M. hapla* plots disease increased during the winter and early summer and resulted in complete death of clover in eight of the ten infested plots. It is suggested that maximum activity of this species is during winter, preventing recovery of the clover and accounting for the greater destructiveness of this nematode. Resistance to attack by the prevalent species of *Meloidogyne* is a desirable character in white clover.

M. T. Franklin

1871—BERGMAN, B. H. H., 1958. "Het bietencystenaaltje en zijn bestrijding. V. Enige microscopische waarnemingen betreffende de ontwikkeling van larven van *Heterodera schachtii* in de wortels van vatbare en resistente planten." *Mededelingen van het Instituut voor Rationele Suikerproductie. Bergen-op-Zoom*, 28 (3), 151–168. [English & French summaries pp. 165–168.]

Bergman examined the development of larvae of *Heterodera schachtii* in roots of host plants (*Beta vulgaris* and *B. macrocarpa*) and of non-host plants (*B. patellaris* and *Hesperis matronalis*) by staining the roots with lactophenol-acid fuchsin. In host plants, females developed within four weeks and males took less time. Although often large numbers of larvae invaded the non-hosts, they showed very little development in *H. matronalis*. In *B. patellaris* they developed only to a flask-shaped stage, but one fully grown male was found. The roots of *B. patellaris* showed deeply staining groups of cells in the region of larvae. This phenomenon was less obvious in *H. matronalis*. Transverse sections of roots showed that giant cells were always associated with developing larvae in host plants. In *B. patellaris*, some larvae caused necrosis immediately on penetrating the roots and these showed no further development. Others induced a restricted formation of giant cells, which soon became atrophied, after which the larvae developed no further. No giant cells were observed in *H. matronalis*.

A. M. Shepherd

1872—BLAKE, C. D. & WALKER, J., 1959. [New South Wales Department of Agriculture, Australia.] "Pineapple wilt." *Agricultural Gazette of New South Wales*, 70 (12), 638–641.

In some parts of the world nematodes (unnamed) have been recognized as an important factor in causing pineapple wilt. In New South Wales no assessment of their possible role has been made but it is considered possible that they may be of importance. M. T. Franklin

1873—BOURIQUET, G., 1959. "Plant diseases and pests in some African territories." *FAO Plant Protection Bulletin*, 7 (5), 61–63.

Bouriquet summarizes the incidence of plant diseases and pests during 1958 in some African territories. In doing so he mentions that in Togo it was at first thought that Kaincopé disease of the coconut palm might be due to nematode attack but further studies did not confirm this.

G. C. Martin

1874—BRÜCHER, H., 1960. "Über das Wildvorkommen des Nematoden *Heterodera rostochiensis* in Nord-Argentinien." *Naturwissenschaften*, 47 (1), 21.

Brücher states that the discovery in 1958 of *Heterodera rostochiensis* in inaccessible places at high altitudes in Argentina confirmed his previous view that the nematode must be indigenous, to explain the frequent occurrence of nematode-resistant strains of such species as *Solanum vernei*, *S. famatinae*, *S. kurizianum* and *S. andigenum*. He holds that the discovery also supports his suggestion that the mountainous region of northern Argentina may be the original home of the nematode.

R. D. Winslow

1875—CAVENESS, F. E., 1959. [Department of Plant Pathology, South Dakota State College, Brookings, South Dakota, U.S.A.] "Status of crop sequences related to *Heterodera schachtii* on sugar beets." *Journal of the American Society of Sugar Beet Technologists*, 10 (4), 283–285.

205 out of 273 sugar-beet fields in California, Colorado and Michigan were found to be infested with *Heterodera schachtii*. Almost two-thirds of the infested fields had experienced a two-year rotation or none, and only a tenth had received the recommended rotations of

four years or more. Population density expressed as larvae per quart of soil diminished with the number of years free of susceptible crops to an average level at four and five years respectively of 145 and 100 in samples taken at mid-season. Initial infective level was not known, but it was calculated that levels of 145 or 100 would give at mid-season a possible potential of 3,770 and 2,600 larvae per sugar-beet respectively, stressing the need for a proper period of rotation.

E. Bennett

1876—CHAMBERS, S. C., 1959. "A revised list of vegetable diseases recorded in Western Australia." *Journal of Agriculture of Western Australia*, 3rd series, 8 (4), 427-432.

Chamber's list of plant diseases in Western Australia includes ten named plants attacked by *Meloidogyne javanica* and six by *Meloidogyne* spp. Also *M.?* *arenaria* and *M.?* *incognita* var. *acrita* on potato and *Heterodera schachtii* on cauliflower.

D. J. Hooper

1877—CHAPMAN, R. A., 1957. [Department of Agronomy, University of Kentucky, Lexington, Ky, U.S.A.] "Species of plant-parasitic nematodes in Kentucky." *Transactions of the Kentucky Academy of Science*, 18 (4), 70-74.

Chapman gives an annotated list of known and suspected plant-pathogenic nematodes found in the roots of, or in association with, certain crop plants in Kentucky. Four species of *Pratylenchus*, two *Heterodera* spp., two *Meloidogyne* spp., two *Rotylenchus* spp., *Helicotylenchus nannus*, *Hoplolaimus coronatus*, *Aphelenchoides ritzema-bosi* and *Xiphinema americanum* were encountered. *M. incognita* is common in home gardens and in green-houses but does not seem to be present in fields generally, except on tobacco which had been raised in association with vegetable gardens.

D. J. Hooper

1878—CICCARONE, A., 1959. "Degenerazione infettiva della vite, nematodi e fumigazione del suolo." *Italia Agricola*, 96 (2), 143-146.

Ciccarone reviews the problem of virus disease of vines in relation to nematode infestation and control with soil fumigation. He describes Italian work which showed the presence of *Xiphinema index*, *Criconemoides* and other nematode genera in the soils around vines affected with infectious degeneration.

J. E. Peachey

1879—CONROY, R. J. & BLAKE, C. D., 1959. [New South Wales Department of Agriculture, Australia.] "Nematode pests of mushrooms." *Agricultural Gazette of New South Wales*, 70 (12), 644-648.

This popular article by Conroy & Blake is a slightly expanded version of the one on nematodes and mushrooms by Blake & Conroy, 1959. [For abstract see *Helm. Abs.*, 29, No. 710.]

D. J. Hooper

1880—COUTURIER, P., 1958. "Une pourriture du collet de la betterave par le nématode de la tige dans la région du Nord." *Phytoma. Paris*, 10 (103), 28-29.

Couturier gives an account, illustrated by photographs of attacks by *Ditylenchus dipsaci* on sugar-beet. The disease is very serious and in some areas the crop is almost completely destroyed.

D. J. Hooper

1881—D'HERDE, J., 1958. "Recherches au sujet des anguillules parasites des plantes." *Revue de l'Agriculture. Brussels*, 11 (7), 1089-1090.

This is a brief general article mentioning those plant-parasitic nematodes so far found in Belgium and their control.

A. M. Shepherd

1882—DOLLIVER, J. S., CLARK, D. G. & MAI, W. F., 1960. "Relationships of population increase of *Pratylenchus penetrans* to vegetative growth of Wando peas." [Abstract of paper presented at the 19th Annual Meeting of the Northeastern Division, American Phytopathological Society, West Springfield, Mass., November 5-6, 1959.] *Phytopathology*, 50 (4), 239.

1883—ELMER, O. H., 1958. "Plant parasitic nematodes." *Circular. Kansas Agricultural Experiment Station*, No. 365, 37 pp.

This comprehensive circular describes the general characters of plant-parasitic nematodes and the effects of attack on their host plants. The most important genera are described and

classified as to their mode of life, i.e. root endoparasites (sedentary or migratory), root ectoparasites (all migratory) or feeders on above-ground parts, with descriptions of the symptoms and mention of the chief host plants. The second half of the circular deals with control, mentioning cultivation, crop rotation, trap crops, hot-water treatment of plant stocks and resistance, followed by chemical treatment of soil, with or without living plants, and methods of application of gaseous, solid and liquid nematicides.

M. T. Franklin

1984—FENWICK, D. W. & MAHARAJ, S. B., 1960. [Red Ring Research Scheme, Department of Agriculture, Trinidad, West Indies.] "Presence of *Aphelenchoides cocophilus* in the roots of *Cocos nucifera*, the coconut palm." [Correspondence.] *Nature, London*, **185** (4708), 259–260.

Fenwick & Maharaj report that on one young coconut plantation where very heavy red ring losses were occurring, they detected the presence of *Aphelenchoides cocophilus* in the roots of 55 apparently healthy trees out of a total of 171 examined: only two of these root-infected trees carried stem infections. They describe the distribution of worms in the roots and the symptoms which accompany root infections. They further state that over a period of four months after detecting root infections, seven of the 55 root-infected trees succumbed to red ring but of the 116 trees in which no infections were detected there was only one casualty.

D. W. Fenwick

1985—FIELDING, M. J., 1959. "Nematodes in plant disease." *Annual Review of Microbiology*, **13**, 239–254.

In this review of the present status of our knowledge of the role of nematodes in plant disease, Fielding classifies the nematodes into those causing plant malformation, those causing necrosis, those associated with fungi, bacteria and virus in plant disease complexes and those associated with deficiency diseases. The final section deals with biological, physical and chemical control. There are 121 references.

R. D. Winslow

1986—GOLDEN, A. M., 1959. "Susceptibility of several *Beta* species to the sugar beet nematode (*Heterodera schachtii*) and root-knot nematodes (*Meloidogyne* spp.)." *Journal of the American Society of Sugar Beet Technologists*, **10** (5), 444–447.

Nine species of *Beta* were tested for their susceptibility to *Heterodera schachtii* and three (*B. patellaris*, *B. procumbens* and *B. webbiana*) were shown to be highly resistant. These same three species were found to be susceptible to six species and sub-species of *Meloidogyne*.

A. M. Shepherd

1987—GRAINGER, J., 1959. "Population studies and successful control of the potato root eelworm." *European Potato Journal*, **2** (3), 184–198.

Studies of populations of the potato-root eelworm suggest that field control measures are only successful when applied to low eelworm populations. Treatments should be capable of lowering the population to about 0.3 cysts with contents per gramme of soil. Grainger claims that this results in large increases in yield together with a decrease in the production of new cysts. A graph is given which sets out the upper limits of population numbers which can be reduced to about 0.3 cysts per gramme of soil by different degrees of control. High population levels can be reduced by withholding potatoes from the soil. Under such conditions there is an annual decrease in cyst numbers which in Britain may vary from 18% to 60% according to temperature and soil moisture. Grainger suggests that results are consistent enough to predict the rate of population decrease after the last potato crop from a known concentration of cysts in the soil to a final population of 0.02 cysts per gramme of soil. It is further claimed that consecutive annual treatments give such high degrees of control particularly with the mixing of mercury dust into the soil, that complete control of potato-root eelworm can be envisaged.

H. R. Wallace

1988—HOPPER, B. E. & PADGETT, W. H., 1960. [Central Experiment Farm, Canada Department of Agriculture, Ottawa, Ontario, Canada.] "Relationship of nemas (nematodes) with the root rot of pine seedlings at the E. A. Hauss State Forest Nursery, Atmore, Alabama." *Plant Disease Reporter*, **44** (4), 258–259.

Serious root rot of pine seedlings in southern nurseries prompted a nematode survey in 1956 of all pine nurseries in the southern U.S.A., but no association between the disease and

plant nematodes was found. In the Alabama nursery in question, sampling in autumn 1957 showed that *Tylenchus* sp. was numerous in the root rot area, and almost non-existent elsewhere. Periodic sampling the following season indicated that root rot symptoms appeared five weeks before the *Tylenchus* sp. and other known or suspected plant nematodes (chiefly *Triplonchium* sp. and *Trichodorus christiei*) became numerous. As the association between the *Tylenchus* and the disease became evident only after the root rot had become severe, the nematode was thought to feed on fungi associated with the decaying roots. *Fusarium* sp. and *Sclerotium bataticola* were present before top symptoms of the disease appeared, the latter fungus increasing during the season. The authors suggest that a fungal pathogen, rather than a nematode, is responsible for the disease.

R. D. Winslow

1889—HUTCHINSON, M. T. & REED, J. P., 1959. [Department of Entomology, New Jersey Agricultural Experiment Station, New Brunswick, U.S.A.] "The pine cystoid nematode in New Jersey." **Plant Disease Reporter**, **43** (7), 801-802.

Larvae of *Meloidodera floridensis* have been found at five sites in New Jersey associated with the roots of blueberry (*Vaccinium corymbosum*) and species of pine. They were not present inside the blueberry roots but large numbers were found in *Pinus rigida* and a few in *P. echinata*.

M. T. Franklin

1890—JACOBSEN, A., 1960. "Lucerneålen breder sig." **Dansk Landbrug**, **79** (4), 96-97.

In Denmark an increasing number of stem nematode attacks in lucerne have been found during the last few years, many of them on farms where lucerne has not been grown before or only to a very small extent. Reference is made to English investigations showing spread by seed of the lucerne stem nematode.

S. Bingeors

1891—JOHNSON, R. T. & WHEATLEY, G. W., 1959. [Spreckels Sugar Company, Spreckels, California] "The effects of different rotations on sugar beet production in land infested with the sugar beet nematode, *Heterodera schachtii*, in the Salinas Valley of California." **Journal of the American Society of Sugar Beet Technologists**, **10** (4), 286-289.

The effects were studied of six rotations, commonly practised in the Salinas Valley, on crop yield and sugar percentage of sugar-beet grown on land infested with beet eelworm. The rotations included lettuce, beans, carrots, barley and broccoli. The authors conclude that it is not advisable to grow beet immediately following broccoli.

A. M. Shepherd

1892—KEMPER, A., 1958. "Kann eine weitere Ausbreitung des Kartoffelnematoden verhindert werden?" **Anzeiger für Schädlingskunde**, **31** (11), 165-170.

Kemper investigated the distribution of *Heterodera rostochiensis* on two German farms, and concluded that infestation was heavier on sandy or light soils—where potatoes were grown more frequently—than on heavier soil, and that the pest spread more rapidly throughout a compact holding than on a divided one where the infested area was more isolated. He frequently found viable cysts in sewage, compost and stable dung, but prolonged storage in the last-named killed the cyst contents, which, however, could pass through farm animals unharmed. He emphasizes the increased risk of introducing the pest by the use of communal or shared farm machinery and concludes that, while direct control is not practicable and crop rotation not always effective, spread of this nematode can best be minimized by greater attention to general farm hygiene.

R. D. Winslow

1893—KEMPER, 1958. "Schäden durch Wurzelgallenälchen an Freilandkulturen." **Gesunde Pflanzen. Frankfurt**, **10** (11), 219-222.

Out-door carrots have been severely damaged by root-knot nematodes in the Ruhr district of Westphalia. Kemper points out that chemical control in the field is impracticable except in the case of very profitable crops and rotation with non-host crops is difficult owing to the wide host range of these parasites. Many weeds have been recorded as hosts. Of these, *Galinsoga parviflora* may be especially dangerous in spreading the nematode as it has been recorded as attacked in green-houses as well as in the field.

M. T. Franklin

1894—KOSKI, J. T., 1957. "The burrowing nematode in Florida." [Abstract.] **Proceedings. Association of Southern Agricultural Workers**, 54th Annual Convention (1957), pp. 142-143.

Koski reports on *Radopholus similis* which attacks citrus and avocado feeder roots and causes spreading decline, especially in the deep sandy soils of the Florida central ridge area. Infestations occur in 28 out of 33 counties surveyed in Florida. Control measures include hot-water treatment of nursery stock and the push and treat method in the groves. D. J. Hooper

1895—LANIER, T. J., 1958. "The establishment of the Soybean Cyst Nematode Identification Laboratory at Memphis, Tennessee." [Abstract.] **Proceedings. Association of Southern Agricultural Workers**, 55th Annual Convention (1958), p. 116.

Soya bean cyst nematode (*Heterodera glycines*) was found in New Hanover County, North Carolina in 1954. In 1956 it was found in a soya bean-producing area along the Mississippi River. An intensive survey of the nematode's distribution was undertaken and a Soya Bean Nematode Identification Laboratory was set up in 1957 in Memphis, Tennessee. This paper gives a summary of the techniques used in the laboratory. J. J. Hesling

1896—LEUKEL, R. W., 1957. "Nematode disease of wheat and rye." **Farmers' Bulletin U.S. Department of Agriculture**, No. 1607, 16 pp. [Revised.]

Leukel describes in detail the life-history of *Anguina tritici* which causes galls in wheat and rye seed heads. Symptoms shown by attacked plants in various stages of their development are described and well illustrated with photographs. Control can only be effected by sowing clean seed in nematode free soil. Experiments have shown that the nematodes die out in moist infested soil in a year, in the absence of susceptible crops. In dry soil the nematodes may remain viable for an indefinite period. A brine flotation method is described for separating galls from seed. Also hot-water treatment at 129°F. for ten minutes preceded by soaking at room temperature for four to six hours may be used. The grain is dipped in cold water after treatment and dried. Oat and barley varieties are generally resistant to attack but the former may be malformed when grown in heavily infested soil. One barley variety, Hansee Hullless, produced imperfect galls. *Aegilops ventricosa* was found to be highly susceptible. Only one wheat variety, Kanred, showed appreciable resistance. D. J. Hooper

1897—LEWIS, S., 1960. "Potato root eelworm under glass. A survey of nurseries in Glamorgan and Monmouthshire." **Agriculture. London**, 67 (3), 127-131.

Lewis surveyed the occurrence of *Heterodera rostochiensis* in green-houses in which tomatoes are grown from numerous areas in Monmouth and Glamorgan. She attempts to correlate the levels of infestation with factors such as size of holding, pH value of the soil, organic matter content and soluble salt concentration, and also with general management. Where a relationship between population level and factors such as these appears to exist, Lewis points out that this may be merely a reflection of poor cultural practice or an attempt to improve poor yields by applications to the soil after the eelworm has got a hold. A. M. Shepherd

1898—LOWNSBERY, B. F., 1959. [Department of Plant Nematology, University of California, Davis, California.] "Studies of the nematode, *Criconeimoides xenoplax*, on peach." **Plant Disease Reporter**, 43 (8), 913-917.

Lownsbury found *Criconeimoides xenoplax* to be a common, often predominant, plant nematode around peach roots in sandy soil in Merced County, California, where peach roots frequently show the "stubby" condition characteristic of injury by ectoparasitic nematodes. Pre-plant treatment with Shell D-D at 40 [American] gallons per acre killed the nematodes and promoted peach growth, but due to the presence of *Pratylenchus vulnus* and *Meloidogyne javanica* and to the non-nematicidal effects of D-D treatment, this could not be taken as evidence of the pathogenicity of *C. xenoplax*. Pot tests with *C. xenoplax* and *M. incognita* var. *acrita* showed that the latter could multiply on and reduce growth of peach seedlings, whereas the former did neither, presumably because the ecological conditions of the experiment were unsuitable for *C. xenoplax*. Periodic sampling in a peach orchard showed that *C. xenoplax* numbers were relatively low in November-December, 1956, higher during

January-April, 1957 and low again in July-September, 1957, from which Lownsbery concludes that the greatest damage, if any, by this nematode probably occurs in winter and early spring.

R. D. Winslow

1899—MARLATT, R. B., MORTON, D. J. & MCKITTRICK, R. T., 1959. [University of Arizona, Mesa, Arizona, U.S.A.] "Nematodes associated with crown-blight diseased cantaloups in desert soils." **Plant Disease Reporter**, 43 (10), 1073-1077.

No relationship could be found between the occurrence of crown-blight of cantaloups and the nematodes found to be present in the roots of diseased plants or in the soil around them. Nematodes from ten genera were identified, but these were also obtained in even larger numbers from soils under healthy vines.

A. M. Shepherd

1900—MAUNG, M. O. & JENKINS, W. R., 1959. [Department of Botany, Maryland Agricultural Experiment Station, College Park, Maryland, U.S.A.] "Effects of a root-knot nematode *Meloidogyne incognita acrita* Chitwood 1949 and a stubby-root nematode *Trichodorus christiei* Allen 1957 on the nutrient status of tomato, *Lycopersicon esculentum* hort. var. Chesapeake." **Plant Disease Reporter**, 43 (7), 791-796.

The effects of low and high infection levels of *Meloidogyne incognita* var. *acrita* and *Trichodorus christiei* on nitrogen, potassium, phosphorus, sodium, calcium, magnesium, reducing sugar, non-reducing sugar and total sugar status of tomato tops and roots was determined. It was concluded that (i) plants highly infected with root-knot nematodes accumulated nitrogen, phosphorus and potassium in high amounts in the roots, (ii) either the absorption of sodium by the roots was prevented or a great proportion of sodium was lost by the roots due to the effect of nematodes, (iii) *T. christiei*, either at the low or high infection level, did not affect the composition of the constituents of plants, but affected their total accumulation in the plants through the reduction of tops and roots, and (iv) neither *M. incognita* var. *acrita* nor *T. christiei* affected the percentage sugar content regardless of population level.

H. R. Wallace

1901—PATTON, J. W., 1958. "Spreading decline of citrus." [Abstract.] **Proceedings. Association of Southern Agricultural Workers**, 55th Annual Convention (1958), p. 116.

1902—PEARMAN, J. A., 1960. "Diseases of roses." **Agricultural Gazette of New South Wales**, 71 (2), 62-70.

Pearman's article includes a short illustrated account of root-knot (*Meloidogyne* sp.) on roses. Control methods recommended include the burning of infected plants and the treatment of the soil with a nematicide.

D. J. Hooper

1903—PENDER, M. T., 1957. "Soybean cyst nematode." [Abstract.] **Proceedings. Association of Southern Agricultural Workers**, 54th Annual Convention (1957), p. 142.

Pender reports on the occurrence in the U.S.A. of *Heterodera glycines* on soya beans, which is confined to 1,680 acres in North Carolina. Quarantine measures are in force to prevent further spread of the nematode. Control is mainly by growing non-host crops in infested soil.

D. J. Hooper

1904—RANKIN, H. W., 1957. "The influence of nematodes on wilt infection of okra." [Abstract.] **Proceedings. Association of Southern Agricultural Workers**, 54th Annual Convention (1957), p. 223.

Rankin gives the results of infecting 10 selections of okra with *Pratylenchus leiocephalus*, *Meloidogyne incognita* var. *acrita* and *Fusarium vasinfectum* alone and *F. vasinfectum* combined with either of the two nematode species. The latter arrangement gave an increase in plant mortality compared with the former.

D. J. Hooper

1905—RISHBETH, J., 1960. [Botany School, University of Cambridge, U.K.] "Factors affecting the incidence of banana wilt ('Panama disease')." **Empire Journal of Experimental Agriculture**, 28 (110), 109-113.

Rishbeth, in discussing the results of experiments to determine factors affecting incidence of banana wilt, briefly mentions a wilt outbreak on the usually wilt-resistant Lacatan bananas in Jamaica. In pot experiments with a wilt-resistant Cavendish banana, infection has become

established in roots invaded by eelworms [presumably *Radopholus similis*]. Therefore eelworms may be responsible for the susceptibility of Lacatan bananas. However, Lacatan bananas on other sites are not showing signs of wilt although "eelworm" and *Fusarium oxysporum* f. *cubense* are both known to be present.
D. J. Hooper

1906—ROBINSON, R. A., 1960. [Scott Agricultural Laboratories, Nairobi, Kenya.] "Notes on Kenya agriculture VIII: important plant diseases." *East African Agricultural and Forestry Journal*, **25** (3), 131–146.

In a list of some 300 diseases of approximately 70 classes of common crops grown in Kenya, Robinson mentions *Aphelenchoides ritzema-bosi* on pyrethrum and *Meloidogyne* sp. on pyrethrum, potatoes, kenaf, carnations and beetroot.
G. C. Martin

1907—RUMP, L., 1958. "Die Wurmfäule der Rüben." *Gesunde Pflanzen. Frankfurt*, **10** (12), 244–248.

Ditylenchus dipsaci has been wide-spread in fodder and sugar-beets. Symptoms of disease and life-history of the nematode are briefly described. Cultural recommendations are given for the prevention of spread of the nematodes and suggestions are made for suitable crop rotations.
M. T. Franklin

1908—SALENTINY, T., 1959. "Untersuchungen über einige Massnahmen zur Verminderung des Befalls von *Ditylenchus dipsaci* an Rüben in Baden-Württemberg." *Zeitschrift für Pflanzenkrankheiten (Pflanzenpathologie) und Pflanzenschutz*, **66** (4), 210–220. [English summary p. 219.]

Salentiny, working with *Ditylenchus dipsaci* damaging beet, found that nematodes attack vigorously in spring and less so in autumn with a drop between these times in July. Planted stecklings are less liable to attack than plants derived from spring-sown seed. No variety of sugar or fodder-beet was resistant to nematodes but of stecklings "Eckendorfer Rot" and "Eckendorfer Gelb" were more resistant than "Peragis Rot" and "Deutsche Barres". Experiments with Systox and Metasytox did not control nematode attack in the field and confirmed the findings of other workers.
J. B. Goodey

1909—SAVARY, A., 1957. [Stations fédérales d'essais agricoles, Lausanne, Switzerland.] "Le problème des nématodes dans les cultures de céréales." *Revue Romande d'Agriculture, de Viticulture et d'Arboriculture*, **13** (11), 93–94.

This is a popular account of the importance of cereal root eelworm (*Heterodera avenae*) in Switzerland. Savary gives data for the yield of 12 varieties of barley in two districts in Switzerland. He suggests that the low yield in one of the districts is associated with the presence of cereal root eelworm.
H. R. Wallace

1910—SCHINDLER, A. F., STEWART, R. N. & SEMENIUK, P., 1959. "A *Fusarium*-nematode complex in carnations." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] *Phytopathology*, **49** (9), 550.

In green-house experiments, carnation plants exposed to any one of the root-knot nematode species *Meloidogyne hapla*, *M. arenaria*, *M. arenaria* var. *thamesi*, *M. incognita*, *M. incognita* var. *acrita* and *M. javanica*, together with *Fusarium oxysporum* f. *dianthi*, showed the incidence of fusarial wilt significantly greater than plants exposed to either nematodes or *Fusarium* alone. With the ectoparasitic nematodes *Helicotylenchus nannus* and *Gottholdsteineria buxophila* (syn. *Rotylenchus buxophilus*) no significant effect on fusarial wilt incidence was demonstrated. Mechanical wounding of the roots increased the rate of wilting in the presence of *F. oxysporum* f. *dianthi* but showed no effect in its absence.
A. M. Shepherd

1911—SCHREIER, O., 1957. [Bundesanstalt für Pflanzenschutz, Vienna, Austria.] "Rübenälchen und Rapsdecke." *Forderungsdienst. Vienna*, **5** (11), 339–340.

Beet eelworm (*Heterodera schachtii*) is common in beet-growing districts of Austria. Owing to the lack of suitable chemical control methods rotation with neutral and enemy crops is practised. Investigations were carried out into the effect of short-term cropping with rape used as green manure. Even when sown in late August or September the plants were invaded

and mature female eelworms developed. This crop should therefore be avoided in infested fields and should not be grown more often than any other susceptible crop. M. T. Franklin

- 1912—SHER, S. A., FOOTE, F. J. & BOSWELL, S. B., 1959. [Department of Plant Nematology, University of California, Riverside, California, U.S.A.] "A root-lesion nematode disease of avocados." **Plant Disease Reporter**, 43 (7), 797-800.

Sher *et al.* report that avocado plantings on ground previously growing walnuts produced unsatisfactory trees, which on examination had stunted root systems containing *Pratylenchus vulnus*. Green-house tests show that *P. vulnus* have a marked adverse effect on the growth of avocado (*Persea americana* var. *Mexicola*). Infected plants are stunted and the root systems are greatly reduced and feeder roots are sparse. Pre-plant soil fumigation was carried out in the field using 120 U.S. gallons per acre of D-D by chisel application at a depth of 14 in. Avocados planted three months after fumigation showed a marked increase in growth over trees on infested, non-treated ground. Very few *P. vulnus* were obtained from soil samples from the treated plots after one and two years and these were below a depth of two feet. There was a good population of *P. vulnus* in the untreated soil. D. J. Hooper

- 1913—SMART, Jr., G. C., 1959. [Department of Plant Pathology, University of Wisconsin, Madison, Wisconsin, U.S.A.] "*Ditylenchus destructor* from grass, dahlia and gladiolus infecting potato tubers." **Plant Disease Reporter**, 43 (11), 1212.

Ditylenchus destructor from (i) a lawn of St. Augustine grass, (ii) roots of dahlia and (iii) roots of a gladiolus bulb, built up large populations on four fungus cultures and on tobacco callus tissue. They also transferred to potato tubers. J. B. Goodey

- 1914—SMITH, A. L. & DICK, J. B., 1960. [Crops Research Division, Alabama Polytechnic Institute, Auburn, Alabama, U.S.A.] "Inheritance of resistance to Fusarium wilt in Upland and Sea Island cottons as complicated by nematodes under field conditions." **Phytopathology**, 50 (1), 44-48.

Crosses between two varieties of *Gossypium hirsutum* (Upland cotton), namely Cook 307 and Hurleys Rowden, resistant and susceptible respectively to Fusarium wilt (due to *Fusarium oxysporum* f. *vasinfectum*) and root-knot nematodes (mainly *Meloidogyne incognita* var. *acrita*) gave no clear separation into resistant and susceptible classes. There appear to be modifiers as well as a major gene for Fusarium resistance and three or more genes for root-knot resistance. When *Gossypium barbadense* (Sea Island cotton) variety Seabrook was crossed with Rowden the results suggested that two dominant Fusarium-resistant factors were present and an excess of wilted plants in the F₂ and Rowden backcross progenies was attributed to extra root-knot susceptibility introduced with Rowden, which is more susceptible to root-knot than Seabrook. The Fusarium resistance in Seabrook was better than that of the Upland cotton, suggesting that the effect of the two genes is additive. An attempt was made to transfer this high Fusarium resistance from Seabrook to Upland cotton by crossing with Stoneville 2B and backcrossing twice to this variety. Three F₄ lines were stabilized for Fusarium resistance and then crossed with Rowden. The results indicate that only one of the resistant genes from *G. barbadense* had been transferred. It is concluded that the interaction between resistance to root-knot nematodes and to Fusarium wilt is an important consideration in the breeding of resistant cotton. When the root-knot population was reduced, by means of EDB, wilting was indirectly lowered but the introduction of root-knot susceptible genes in Rowden crosses resulted in more wilted plants than expected. The resistance of Cook to root-knot probably accounts for its greater resistance to wilt. The two Fusarium resistant genes in Seabrook gave greater wilt-resistance than the single Fusarium-resistant gene plus the root-knot resistance in Cook. M. T. Franklin

- 1915—SOMASEKHAR, P., 1959. "Nematodes associated with Arabica coffee in India." **FAO Plant Protection Bulletin**. Rome, 7 (6), 78-79.

Somasekhar gives a short account of the nematodes found in soil and roots in association with *Coffea arabica* production in various coffee zones in India. In addition to the plant-parasitic nematodes *Radopholus similis*, *Tylenchorhynchus* sp., *Xiphinema insignis* and *Pratylenchus pratensis*, predacious species of the genera *Mononchus*, *Cephalobus* and *Ironus* and the free-living form *Rhabditis* were found to be present. Symptoms on the aerial parts of the

plants, due to nematode attack on the roots, are described. Somasekhar presumes that one of the main reasons for improvement in the growth of coffee trees after the addition of composted farmyard manure to the soil in badly infested areas, is the increase in such soils of the predacious nematode species that are antagonistic to the plant-parasitic species.

G. C. Martin

1916—SPRAU, F., 1959. "Der Kartoffelnematode, eine schleichende Gefahr für den Kartoffelbau." *Praktische Blätter für Pflanzenbau und Pflanzenschutz*, 54 (1), 11–40.

This is a general paper on *Heterodera rostochiensis* compiled from the literature without references or acknowledgments. An appendix lists German and Bavarian legislative measures to control the pest.

R. D. Winslow

1917—TAYLOR, D. P., 1959. [Department of Plant Pathology and Botany, University of Minnesota U.S.A.] "First report of *Meloidogyne javanica* on greenhouse grown *Solanum pseudo-capsicum*." *Plant Disease Reporter*, 43 (6), 664.

Taylor found *Solanum pseudo-capsicum* severely attacked by *Meloidogyne javanica*. The plants had small leaves and few flowers and berries. *Impatiens sultani* was also heavily attacked but growth was not impaired.

M. T. Franklin

1918—TAYLOR, D. P. & WYLLIE, T. D., 1959. "Interrelationship of root knot nematodes and *Rhizoctonia solani* on soybean emergence." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] *Phytopathology*, 49 (9), 552.

In a green-house experiment, *Meloidogyne javanica* and *M. hapla* in combination with *Rhizoctonia solani* had a severe effect on the emergence of soya beans. Emergence, expressed as a percentage of the control, was as follows: *M. javanica* alone, 98%; *M. hapla* alone, 83%; *R. solani* alone, 50%; *M. javanica* plus *R. solani*, 17%; *M. hapla* plus *R. solani*, 2%.

A. M. Shepherd

1919—THOMASON, I. J., ERWIN, D. C. & GARBER, M. J., 1959. [Department of Plant Nematology, University of California Citrus Experiment Station, Riverside, California, U.S.A.] "The relationship of the root-knot nematode, *Meloidogyne javanica*, to Fusarium wilt of cowpea." *Phytopathology*, 49 (9), 602–606.

Using the varieties of cowpea (*Vigna sinensis*) Grant, which is tolerant to wilt disease incited by *Fusarium oxysporum* f. *tracheiphilum*, and Chino 3, which is susceptible, the authors carried out pot experiments in the green-house to determine the effect on the expression of wilt disease of infestation with root-knot nematodes, *Meloidogyne javanica*, to which both varieties of cowpea are susceptible. In the presence of a heavy infestation of *M. javanica* the wilt-tolerant variety became more severely wilted than the susceptible. In field experiments on soils containing both pathogens, nematicidal treatment with EDB or Nemagon resulted in reduction of nematode galling in both varieties and reduction in wilt disease of 71% in Grant and 41% in Chino 3. It is concluded that there is a definite interaction between the two pathogens, and that while this may be due in part to the entry of *Fusarium* through wounds caused by nematodes, other factors must also be involved.

M. T. Franklin

1920—THOMASON, I. J. & MCKINNEY, H. E., 1960. [Department of Plant Nematology, Citrus Experiment Station, Riverside, California, U.S.A.] "Reaction of cowpeas, *Vigna sinensis*, to root-knot nematodes, *Meloidogyne* spp." *Plant Disease Reporter*, 44 (1), 51–53.

Cowpeas (*Vigna sinensis*) in 44 varieties, and asparagus bean (*V. sesquipedalis*) were grown in glass-house and field tests using soil inoculated with galled Rutgers tomato roots. Plants were lifted six weeks after emergence in glass-house tests and 16 weeks after sowing in field tests, and given a severity rating for root galling. Cowpeas showed moderate to severe infection with *Meloidogyne javanica* but were resistant within a similar range to *M. incognita* var. *acrita*. None of the cowpea varieties under test gave a level of resistance to *M. javanica* leading to inhibition of reproduction on the host. The asparagus bean was susceptible to *M. incognita*, *M. incognita* var. *acrita* and *M. javanica*, but was resistant to *M. hapla*.

H. Jacks

1921—TINNALÄ, A., 1960. "Apila-ankeroisen siemenlevintä ja kotimaisten apilakantojen tuhonalttius." **Maatalous ja Koetoiminta. Helsinki**, 14, 228–233. [English summary p. 233.]

Stem nematode (*Ditylenchus dipsaci*) is spread with clover seed. A nematode population from Padasjoki (central Finland) only caused slight damage to white clover, alsike clover and lucerne. Of red clover varieties Merkur and Ulva were the most resistant to injury. The Finnish varieties Tammisto and Jo TPA 1 as well as several local varieties were very susceptible. S. Bingefors

1922—TOWNSHEND, J. L. & DAVIDSON, T. R., 1960. [Plant Pathology Laboratory, Research Branch, Canada Department of Agriculture, St. Catharines, Ontario, Canada.] "Some weed hosts of *Pratylenchus penetrans* in Premier strawberry plantations." **Canadian Journal of Botany**, 38 (3), 267–273.

Townshend & Davidson found *Pratylenchus penetrans* in the roots of 55 weed and seven cultivated plant species belonging to 52 genera in 23 families. They point out that their host list and those of Jensen & Oostenbrink, s'Jacob & Kuiper [for abstracts see Helm. Abs., 22, No. 626c and 26, No. 458a] contain 232 plant species belonging to 126 genera in 51 families, indicating that *P. penetrans* is polyphagous. Plants varied greatly in susceptibility and in suitability as food; number of nematodes per gramme of dried root ranged from seven in *Sisymbrium altissimum* to 27,680 in *Rorippa sylvestris*. In general weeds with soft-textured roots (including most of the perennials examined) contained more nematodes per gramme of root, had more extensive lesions and appeared more susceptible to injury than did those with hard-textured roots (most of the annuals examined). It is suggested that attention to weed control should be an important part of any nematode control measure. R. D. Winslow

1923—WINSTEAD, N. N. & RIGGS, R. D., 1959. [Department of Plant Pathology, North Carolina State College, Raleigh, North Carolina, U.S.A.] "Reaction of watermelon varieties to root-knot nematodes." **Plant Disease Reporter**, 43 (8), 909–912.

Winstead & Riggs tested 83 varieties and lines of water-melon (*Citrullus vulgaris*) for susceptibility to *Meloidogyne incognita*, *M. incognita* var. *acrita* (two populations), *M. arenaria*, *M. javanica* and *M. hapla*. All the plants were susceptible to all root-knot populations except *M. hapla*: there was slight reproduction of this species on all plants. It appears likely that Bessey's record (1911) of resistance to root-knot nematodes in a *Fusarium*-wilt-resistant watermelon cross related to a pathogenically different population of *M. hapla*. M. T. Franklin

Insect-Parasitic Nematoda

See Nos.: 1998, 2097.

1924—CRISP, D. T., 1959. "Hydracarines and nematodes parasitizing *Corixa scotti* (D. and S.) (Hemiptera) in western Ireland." **Irish Naturalists' Journal**, 13 (4), 88–92.

An immature *Tetramermis* sp. parasitizes up to 70% of the individuals, and considerably reduces the fecundity of several populations of *Corixa scotti* in western Ireland. *C. castanea*, *C. dorsalis* Leach and *Cymatia bansdorffi* (C. Sahlb.) were also parasitized. H. E. Welch

Nematoda Parasitic in Other Invertebrates

See Nos.: 2010, 2011, 2325.

Control

See also Nos.: 1878, 1883, 1887, 1891, 1892, 1893, 1894, 1896, 1898, 1902, 1903, 1908, 1911, 1912, 2003.

- 1925—BOYD, G. R., 1957. "The determination of residues of 0-2, 4-dichlorophenyl 0, 0-diethyl phosphorothioate ('C-C 13 Nemacide') by cholinesterase inhibition." [Abstract of paper presented at 35th Annual Meeting of the Virginia Academy of Science, May 8-11, 1957.] *Virginia Journal of Science*, 8 (4), 315.

Boyd describes adaptations of existing methods for the estimation of V-C 13 residue. This chemical is itself only a weak inhibitor of cholinesterase and has a greater stability and lower water solubility than parathion or systox.

J. E. Peachey

- 1926—CHANDLER, E. K., JOHNS, D. M., RUSSEL, D. A. & CARTER, C. R., 1958. "Response of four cotton varieties to fumigation for the control of soil nematodes." [Abstract.] *Proceedings. Association of Southern Agricultural Workers*, 55th Annual Convention (1958), p. 66.

Chandler *et al.*, working with cotton-growing coastal plain soils in Louisiana, found that Dowfume W-85 [ethylene dibromide] had certain significant effects on yields, boll size and lint percentage, depending on location and variety of cotton. Fumigation did not influence soil pH or the phosphorus, potassium, calcium or magnesium content of the soil or plant tissues.

J. E. Peachey

- 1927—COOPER, W. E., WELLS, J. C., SASSER, J. N. & BOWERY, T. G., 1959. [Department of Plant Pathology, North Carolina State College, Raleigh, N.C., U.S.A.] "The efficacy of preplant and postplant applications of 1, 2-dibromo-3-chloropropane for control of the sting nematode, *Belonolaimus longicaudatus*." *Plant Disease Reporter*, 43 (8), 903-908.

Cooper *et al.* describe experiments to control *Belonolaimus longicaudatus* using a granular formulation of dibromochloropropane in pre-plant applications for peanuts, cotton, corn and soya beans. There were considerable yield increases and nematode control was proportionate to the rate used. Post-planting treatments were not as effective. After treatment the reduced nematode populations subsequently built up but the plants seem to have been protected during the critical period. A warning note about bromide residues follows analysis of some of the treated crop produce.

J. E. Peachey

- 1928—DALLIMORE, C. E., 1960. "A two-bottom two-way plow sole fumigator." [Abstract of paper presented at the 1959 Annual Meeting of the Pacific Division, American Phytopathological Society, San Diego, Calif., June 17-19, 1959.] *Phytopathology*, 50 (1), 83.

Dallimore recommends plough-sole application of soil fumigants under Idaho conditions, and describes the necessary adaptation of a two-bottom, two-way plough for this purpose. The fumigant stream is directed into the plough furrow ahead of the overturning soil.

J. E. Peachey

- 1929—DEAN, J. L., FIELDING, M. J., WHITLOCK, L. S., FRESHMAN, K. C. & COLEMAN, O. H., 1957. "Two years' results of soil fumigation for the control of parasitic nematodes on sorgho." [Abstract.] *Proceedings. Association of Southern Agricultural Workers*, 54th Annual Convention (1957), p. 79.

In replicated fumigation experiments on fine sandy loam used for growing sorgho, the authors found that ethylene dibromide (W-85) at 7.5 U.S. gal. per acre controlled the parasitic nematodes, principally *Pratylenchus zeae*, *Pratylenchus* spp., and *Tylenchorhynchus* spp., but did not result in any crop response.

J. E. Peachey

- 1930—D'HERDE, J., 1958. "La lutte contre le nématode doré de la pomme de terre (*Heterodera rostochiensis* Woll.)." *Revue de l'Agriculture. Brussels*, 11 (8), 1238-1240.

The importance of potato-root eelworm as a pest is discussed, and d'Herde briefly describes methods of control by application of chemicals to the soil, and by the selection of different existing varieties of potato which are resistant to the eelworm.

H. R. Wallace

- 1931—FRENCH, N., LICHTENSTEIN, E. P. & THORNE, G., 1959. [University of Wisconsin, Madison, U.S.A.] "Effects of some chlorinated hydrocarbon insecticides on nematode populations in soils." *Journal of Economic Entomology*, 52 (5), 861-865.

From laboratory and field investigations of nematode populations in soils treated with high rates of chlorinated hydrocarbon insecticides (Heptachlor, D.D.T., Aldrin and Lindane)

the authors state that although some compounds or their breakdown products exerted an effect, it was impossible to draw a conclusion beyond that under field conditions nematode populations did not appear to have been seriously affected by the insecticides. J. E. Peachey

1932—GOOD, J. M. & STEELE, A. E., 1959. [U.S. Department of Agriculture Nematology Field Laboratory, Georgia Coastal Plain Experiment Station, Tifton, Georgia.] "Evaluation of application methods for applying 1, 2-dibromo-3-chloropropane for control of root knot." **Plant Disease Reporter**, **43** (10), 1099-1102.

Good & Steele compare several methods for applying dibromochloropropane for the control of root-knot nematodes. They conclude, that regardless of method of application or formulation, adequate control is obtained if the chemical is placed six inches or more below the soil surface. J. E. Peachey

1933—HAGLUND, W. A. & KING, T. H., 1959. [Dept. of Plant Pathology and Botany, Institute of Agriculture, University of Minnesota, St. Paul, Minnesota, U.S.A.] "The effect of nematodes on the development of root rot and yield of canning peas." **Plant Disease Reporter**, **43** (7), 787-790.

In field and green-house trials using Dowfume MC-2, Dorrone and Telone, it was found that the yield of canning peas increased after the use of these fumigants, but that only Dowfume MC-2 controlled root rot. All three reduced the nematode populations of the soil but the relationship of nematodes to root rot could not be established. A. M. Shepherd

1934—HANSBROUGH, T. & HOLLIS, J. P., 1959. "The influence of soil fumigation, fertilization and other cultural factors on nutrient content of pine nursery seedlings and soil." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] **Phytopathology**, **49** (9), 540.

This brief abstract mentions control of dagger and stunt nematodes in passing but the paper was primarily concerned with other topics. J. B. Goodey

1935—HARRISON, M. B., 1959. "The retention in the soil of nematocides toxic to golden nematode." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] **Phytopathology**, **49** (9), 540.

Harrison describes a method for the detection of lethal concentrations of nematocides in soils after injection, using potato-root eelworm cysts. In tests at 70°F. with D-D applied at 45 U.S. gal. per acre lethal concentrations were not present in the soil 72 hours after application. With ethylene dibromide (W-85) at 35 U.S. gal. per acre at 80°F. lethal concentrations were not present 96 hours after treatment. J. E. Peachey

1936—HEYNS, J., 1959. [Central Research Station, Rustenburg, South Africa.] "More farmers using E.D.B. to control eelworm." **Farming in South Africa**, **35** (4), 44-46.

Heyns describes the conditions and equipment necessary for the successful application of ethylene dibromide for the control of eelworm in tobacco-growing soils. The best temperature conditions are from 60°F. to 70°F. The tractor mounted delivery equipment has a constant delivery rate adjusted for correct dosage, for which recommendations are given. Row treatments are satisfactory when the infestation is not too severe. At least a fortnight should elapse before planting and with fertile soils, pre-plant nitrogen fertilizer applications should be reduced, in order to avoid over-luxuriant tobacco. J. E. Peachey

1937—HUGHES, M. B., 1958. "Subsoiling of tomatoes and its relation to nematocide treatment (tests covered the years 1955-1956)." [Abstract]. **Proceedings. Association of Southern Agricultural Workers**, 55th Annual Convention (1958), pp. 152-153.

Hughes describes plot experiments with Dowfume 40 [ethylene dibromide] and sub-soiling of tomato-growing land. Significant responses in fruit production were found from both treatments. Although the plots were heavily infested with a root-knot nematode, sub-soiling had more influence on yield increase than did the nematicide, and plots receiving both treatments did not show much greater benefit than those receiving only one of the treatments. It is suggested that sub-soiling and nematicidal treatment both cause an increase in the root absorbing system of the tomatoes, thus providing increased water in time of drought.

J. E. Peachey

1938—JENKINS, L. & GUENGERICH, H. W., 1959. [Missouri Agricultural Experiment Station, Columbia.] "Chemical dips for the control of nematodes on bare root nursery stock." **Plant Disease Reporter**, **43** (10), 1095-1097.

Jenkins & Guengerich describe the use of American Cyanamid 18133 [an organo-phosphorus compound], hydrogenated fish oils and Union Oil 279 as dips for nursery stock in attempts to disinfest them from root-knot or *Pratylenchus penetrans*.
J. E. Peachey

1939—KANTZES, J. G., JENKINS, W. R. & DAVIS, R. A., 1959. [Maryland Agricultural Experiment Station, Department of Botany, College Park, Maryland, U.S.A.] "Control of root-knot nematodes on vegetables on the eastern shore of Maryland with 1, 2-dibromo-3-chloropropane-fertilizer mixtures." **Plant Disease Reporter**, **43** (12), 1231-1235.

Kantzes *et al.* describe a series of experiments to test the effectiveness of dibromochloropropane applied as a granular formulation mixed with fertilizer and placed 3 to 4 inches deep. Using this mixture, root-knot (*Meloidogyne incognita* var. *acrita*) was reduced in both cantaloup and tomato, using side dressings at sowing and after planting respectively. In the latter case the degree of control was equal to that obtained from a conventional pre-planting application of D-D. The rates of 25% technical dibromochloropropane used (24 and 35 lb. per acre) did not appear to injure the plants.
J. E. Peachey

1940—LEAR, B. & AKESSON, W. B., 1959. [University of California, Davis, California.] "Applying nematocides." **Farm Chemicals**, Philadelphia, **122** (12), 38-41.

Lear & Akesson describe the commercially available nematocides, suitable for field application as liquids or granules. Optimum, economic and physical conditions for soil treatment and the use of distributing machinery are also discussed.
J. E. Peachey

1941—NETTLES, W. C., LEWIS, J. N. & SMITH, F. H., 1958. [Clemson Agricultural College, Clemson, South Carolina, U.S.A.] "Control of root knot and other nematodes." **Circular**, Clemson Agricultural College, South Carolina, No. 382, 24 pp. [Revised.]

Nettles *et al.* describe the important nematode problems of South Carolina, and their control with crop rotation, the use of resistant varieties and soil fumigation. Suitable crops for soil fumigation and the fumigants are listed and rates and methods of application for large or small areas given, together with general directions and precautions. The authors conclude with notes on hygienic measures, adequate cultural practices and the relationship of nematodes to plant diseases.
J. E. Peachey

1942—NIGH, Jr., E. L., 1960. [Agrotécnica delle Valle, S. A., Mexicali, B. C., Mexico.] "Evaluation of two systemic insecticides applied as seed treatment for the control of *Meloidogyne incognita acrita* attacking cotton." **Plant Disease Reporter**, **44** (4), 288-289.

Nigh found no control of root-knot infection in seedlings grown from seed treated with either of the organo-phosphorus compounds Thimet or Disyston. Seedlings grown in Nemagon-treated soil had a lower root-knot index.
J. E. Peachey

1943—OSBORNE, W. W., 1957. "A greenhouse comparison of the relative phytotoxicity and nematocidal efficacy of certain chemical soil treatments." [Abstract of paper presented at 35th Annual Meeting of the Virginia Academy of Science, May 8-11, 1957.] **Virginia Journal of Science**, **8** (4), 268.

In greenhouse trials, Osborne found that satisfactory root-knot control, with lack of phytotoxicity, was obtained with D-D, Vapam, Durlone and DCB-60 applied 7, 14 and 21 days before planting tomatoes. Nemagon and Thimet were phytotoxic and V-C 13 did not give sufficient root-knot control.
J. E. Peachey

1944—PADEN, W. R. & RILEY, J. A., 1957. "Yield response of cotton on lakeland sand from fumigation with D-D." [Abstract.] **Proceedings**, Association of Southern Agricultural Workers, 54th Annual Convention (1957), pp. 73-74.

Paden & Riley found that on soils commonly infested with nematodes, the yields of cotton can be greatly increased through soil fumigation with D-D. A larger root system develops and this enables the cotton plant to resist drought better. The fumigant was applied in row treatments, using delivery equipment attached to a sub-soil plough, at a depth of 12-14 in.
J. E. Peachey

1945—PETERS, B. G., 1959. [Imperial College of Science and Technology, London.] "The chemical control of plant eelworms." **Land. London**, No. 7, pp. 25-28.

In this general article, Peters briefly describes the importance of plant-parasitic nematodes in agriculture and mentions chemicals used to control them. Hope is expressed that with the synthesizing of new materials regularly screened for other uses, there is the constant possibility of a new nematicide being found.

J. E. Peachey

1946—PIEROH, E. A., WERRES, H. & RASCHKE, K., 1959. [Hauptlaboratorium der Schering AG, Berlin.] "Trapex—ein neues Nematizid zur Bodenentseuchung." **Anzeiger für Schädlingskunde**, 32 (12), 183-189. [English summary p. 189.]

The authors describe experiments to evaluate the nematocidal activity of Trapex (methyl isothiocyanate preparation). It is shown to be active against free-living nematodes, root-knot and the cysts of *Heterodera* spp., as well as being a soil fungicide. Soil type, moisture or temperature do not appear to influence the efficacy of the fumigant. Low soil temperatures, however, necessitate a longer post-treatment period before planting. Improved quality and higher yields of crops follow treatment with Trapex. It is recommended that sprinkling direct into the furrows, without further dilution is preferable to injection or mixing with a rotary hoe. The pungent smell of Trapex acts as a repellent and makes poisoning practically impossible. Methyl isothiocyanate is more active against *Aphelenchoides ritzema-bosi*, in vitro, than any of the higher isothiocyanates. Compared to dibromochloropropane and sodium methyl dithiocarbamate, methyl isothiocyanate is more active in the soil, in terms of weight of active substance, and less dependent on soil temperature than sodium methyl dithiocarbamate. [In the soil sodium methyl dithiocarbamate liberates methyl isothiocyanate, which is presumed to be the nematocidal agent.]

J. E. Peachey

1947—PLUMMER, J. C., 1959. "Treatment gives complete control of eelworm." **Grower. London**, 52 (6), 303-305.

Plummer describes the heat therapy used by Rowe of Wellington, Somerset, U.K. primarily for the control of chrysanth virus. Complete control of eelworm is apparently also claimed when the chrysanthemum plants are placed in a green-house raised to 90°F. [other information in the text suggests that this figure should read 97°F.] over three to four days and held constant for three to four weeks, using warmed water at 97°F. for watering.

J. E. Peachey

1948—ROEDIGER, K. J., 1958. "Das Stockälchen. Auftreten in Wehrda und fünfjährige Versuche des Pflanzenschutzes Kassel-Harleshausen zu seiner Bekämpfung." **Gesunde Pflanzen. Frankfurt**, 10 (3), 45-48.

Local conditions have favoured stem eelworm disease of rye due to *Ditylenchus dipsaci*. Experiments in control were carried out using calcium cyanamide at rates equivalent to 40 kg. to 80 kg. of nitrogen per hectare applied at different times of the year. It is concluded that applications of nitrogen at 40 kg. to 50 kg. per hectare in spring enables the rye to get over the period of greatest danger. Crop rotation is also important; on light soils rye should not be grown more often than three-yearly and good quantities of dung should be applied. The Dutch variety Heertvelder shows some resistance to stem eelworm owing to its rapid growth early in the year.

M. T. Franklin

1949—THOMASON, I. J., 1959. [Department of Plant Nematology, Citrus Experiment Station, Riverside, California, U.S.A.] "Chisel application of methyl bromide for control of root-knot nematode and Fusarium wilt." **Plant Disease Reporter**, 43 (5), 580-483.

Thomason injected a methyl bromide formulation at 200 lb. and 300 lb. per acre using chisel applicators at 8 in. depth and polythene covers. This treatment controlled root-knot, *Fusarium* wilt and other fungi and increased growth of beans, though there was an initial stunting attributable to depression of nitrifying bacteria. EDB(W-85) at 86.5 lb. per acre was satisfactory as a purely nematocidal treatment.

J. E. Peachey

1950—UHLENBROEK, J. H. & BIJLOO, J. D., 1959. [N.V. Phillips—Roxane Central Research Laboratory, Weesp.] "Investigations on nematocides. II. Structure of a second nematocidal principle isolated from *Tagetes* roots." *Recueil des Travaux Chimiques des Pays-Bas, Amsterdam*, **78** (5), 382–390.

Uhlenbroek & Bijloo describe the identification of a second nematocidal substance from *Tagetes* roots as the highly unstable 5-(3-buten-1-ynyl)-2,2'-bithienyl.

J. E. Peachey

1951—VISSER, T. & VYTHILINGHAM, M. K., 1959. "The effect of marigolds and some other crops on the *Pratylenchus* and *Meloidogyne* populations in tea soil." *Tea Quarterly. Tea Research Institute of Ceylon*, **30** (1), 30–38.

Field experiments showed that both young and mature tea plants are highly susceptible to *Pratylenchus coffeae*. Unlike young tea plants, mature tea was not susceptible to *Meloidogyne javanica*. Two species of marigold, *Tagetes erecta* and *T. patula*, considerably reduced populations of both these nematode species. As a cover crop the marigolds markedly decreased the infestation of tea roots by *Pratylenchus coffeae*. The authors suggest that the cultivation of marigolds as a pre-crop or cover crop in young tea is a feasible method of control. *Crotalaria* spp. were also found to be suitable bush crops in eelworm-infested areas.

H. R. Wallace

1952—WARREN, L. E., 1959. [Agricultural Chemicals Research, Sacramento Field Station, California, U.S.A.] "Response of peaches and walnuts to nematode control." *Down to Earth. Midland, Michigan*, **15** (3), 10–13.

Warren reports on the use of dichloropropenes (Telone), ethylene dibromide (Dowfume W-85) and dibromochloropropane (Fumazone) for the control of nematodes attacking peach and walnut. It is concluded that reduction in nematode populations and improved plant growth can be obtained by pre-plant treatment and sustained by side dressings of established trees applied by injection or in irrigation water. Applications of 30 to 60 lb. per acre of Fumazone to established trees does not appear to be phytotoxic.

J. E. Peachey

1953—WILCOX, G. E., NEWSOM, L. D., RUSSEL, D. A. & JOHNS, D. M., 1957. "Relationship of fertiliser treatment and soil fumigation in cotton production." [Abstract.] *Proceedings. Association of Southern Agricultural Workers*, 54th Annual Convention (1957), p. 73.

Wilcox *et al.* describe experiments to determine the influence of nematode control on the incidence of *Fusarium* wilt and on crop response. Soil fumigation significantly reduced the number of root-knot larvae in the soil and the percentage of plants affected with wilt as well as increasing yields of cotton. Where there was a significant fertilizer-fumigant interaction, a response to fumigation was only obtained for the high rate of non-nitrogenous fertilizer treatments.

J. E. Peachey

1954—YOUNG, V. H., 1957. "The activity of V-C 13 nemacide, a non-fumigant type nematocide." [Abstract.] *Proceedings. Association of Southern Agricultural Workers*, 54th Annual Convention (1957), pp. 222–223.

Young describes the properties of V-C 13 nematocide (0-2,4-dichlorophenyl 0-0-diethylphosphorothioate). The compound is only slightly volatile and remains in the soil for a long time. It can be applied as a pre- or post-plant treatment for the control of root and root-knot nematodes free in the soil. In green-house tests V-C 13 controlled root-knot for three years. In field applications control of certain nematodes is claimed for one or two years. The author gives toxicological data and advises care in handling.

J. E. Peachey

Miscellaneous

See also Nos.: 1983, 1985, 1990, 1999, 2000, 2001, 2014, 2040, 2060, 2072, 2166, 2180.

1955—CHAUHAN, B. S. & RAMKRISHNA, G., 1960. [Zoological Survey of India, Calcutta.] "Our present knowledge of plant-parasitic and soil nematode from the Indian region and importance of their study." *Indian Journal of Helminthology*, Year 1958, **10** (2), 64–76.

Brief accounts are given of the plant parasites, *Aphelenchoides sphaerocephalus*, *Ditylenchus drepanocerus*, *D. angustus*, *Anguina tritici*, *Nothanguina cecidoplastes*, *Pratylenchus* spp., *Radopholus similis* and *Meloidogyne* spp. in India. Records of *Diploscapter coronata*, *Mononchus* sp. and *Mermis* sp. are also mentioned, and some 50 references are given. R. D. Winslow

1956—KEMPER, A., 1959. [Pflanzenschutzamt Münster, Germany.] "Über die Bedeutung freilebender Nematoden als Pflanzenschädlinge und Möglichkeiten ihrer Bestimmung im Boden." *Gesunde Pflanzen*. Frankfurt, **11** (7), 135–138.

In this short review, Kemper emphasizes the importance of plant nematodes in instances of "soil sickness" (Bodenmüdigkeit) frequently attributed to trace element deficiencies or to toxins liberated by decaying roots. Apart from the direct effects of their feeding, nematodes may provide inlets for other pathogens and act as virus vectors. Stem nematode and the root parasites *Pratylenchus* and *Paratylenchus* are dealt with briefly, and Seinhorst's elutriator for extracting nematodes from soil is described and illustrated. R. D. Winslow

TAXONOMY

Monogenea

See also No.: 1862.

1957—ERGENS, R. & LUCKÝ, Z., 1959. [Biologický ústav ČSAV, parasitologie, Praha, Czechoslovakia.] "*Dactylogyrus dyki* n.sp. auf den Kiemen der Barbe (*Barbus barbus* (L.))." *Věstník Československé Zoologické Společnosti*, **23** (4), 351–353.

Ergens & Lucký describe *Dactylogyrus dyki* n.sp. found on the gills of *Barbus barbus* in Czechoslovakia in 1956–57. The new species resembles most closely *D. chinensis* Gusev, 1955, but differs from it in the size of the chitinous parts of the haptor and in the well developed vaginal stiffening. N. Jones

Aspidobothria

See No.: 2071.

Digenea

See also No.: 1860.

1958—AGARWAL, S. M., 1959. [Zoology Dept., M. M. V., Jabalpur University, India.] "Studies on the metacercaria *Clinostomoides dollfusi* n.sp. (Trematoda: Clinostomatidae) from siluroid fishes." *Indian Journal of Helminthology*, Year 1958, **10** (1), 13–18.

Agarwal describes *Clinostomoides dollfusi* n.sp. from the metacercarial stage found unencysted beneath the operculum of *Clarias* sp. and *Saccobranhus* sp. The adult and its host are unknown. The new species possesses intestinal caeca with diverticula on the lateral and medial sides; the gonads, cirrus sac and genital pore are caudal in position; and the uterus is far removed from the ventral sucker. It differs from *C. brienii* Dollfus, 1950, the type species of the genus and known only as an adult, by its medium size (7.8 to 9.8 mm. as against 30 mm.), the absence of lateral sacculations of the uterus, and the greater distance between the ventral and oral suckers. *Clinostomum ophicephali* Tubangui & Masilunigan, 1944 is transferred to *Clinostomoides*, of which an emended diagnosis is provided, and is differentiated from *C. dollfusi* by its habitat in the gall-bladder of its host, its spinous cuticle, and its small size (2.8 mm.). E. I. Sillman

1959—AGARWAL, S. M., 1959. [Zoology Dept., M.M.V., Jabalpur University, India.] "Studies on two new species of the genus *Paryphostomum* (Dietz-1909), (Trematoda: Echinostomatidae) from *Bubulcus ibis*." **Indian Journal of Helminthology**, Year 1958, **10** (1), 19–30.

Agarwal describes *Paryphostomum dollfusi* n.sp. and *P. bubulcusi* n.sp. from the intestine of *Bubulcus ibis*, shot in the vicinity of Jabalpur (India). He suggests that the following species should be included in the genus *Artyfechinostomum* Lane, 1915: *P. indicum*, *P. palustris*, *P. mehrai*, *P. mehrai rattus*, as well as *A. sufaratyfex* (the type species). The genus *Paryphostomum* then contains: *P. radiatum* (the type species), *P. segregatum*, *P. lobulatum*, *P. testitri-fo- lium*, *P. pentalobum*, *P. carbonis* and *P. horai*. The new species, *P. bubulcusi* and *P. dollfusi*, differ from the other species of *Paryphostomum* by the following combination of characters: (i) a larger number of collar spines (46 to 47); (ii) the vitellaria in the hind-body not approaching post-testicular median field; and (iii) the aspinous cuticle. Although resembling each other closely the new species can be differentiated by the number of collar spines, the number and character of the lobes of the testes, and by the ratio of the oral sucker to the pharynx. A key to species of *Paryphostomum* is given. E. I. Sillman

1960—CABALLERO y C., E., 1958. [Laboratorio de Helminología, Escuela Nacional de Ciencias Biológicas, I.P.N., Mexico, D.F.] "Helmintos de la República de Costa Rica. III. Descripción de una nueva especie de tremátodo digéneo, *Carneophallus skryabini* nov. sp." **Anales de la Escuela Nacional de Ciencias Biológicas, Mexico**, **9** (1/4), 77–83. [English summary pp. 81–82.]

Carneophallus skryabini n.sp., found in the small intestine of *Didelphis marsupialis etensis* in Costa Rica, is described. It differs from other *Carneophallus* species in the structure and morphology of the male genital papilla. The author agrees with Baer, and Cable & Kuns that *Spelotrema* and *Monocaeum* are synonyms of *Microphallus*, the validity of *Spelotrema* as presented by Skryabin in 1952 being rejected and the priority of *Microphallus* retained. The author further proposes the following new combinations: *C. papillorobusta* n.comb. for *S. papillorobusta* Rankin, 1940 and *C. arenaria* n.comb. for *S. arenaria* Belopolskaya, 1953. It is also mentioned that *S. pseudogonotyla* Chen, 1944 was transferred to *Carneophallus* by Cable & Kuns in 1951. N. Jones

1961—CHENG, T. C., 1960. [Lafayette College, Easton, Pennsylvania, U.S.A.] "Studies on the trematode family Brachycoeliidae. IV. A revision of the genus *Mesocoelium* Odhner, 1911; and the status of *Pintnaria* Poche, 1907." **American Midland Naturalist**, **63** (2), 439–469.

Cheng reviews the genus *Mesocoelium* and 28 species are recognized as valid, each of which is described and figured. *M. waltoni* Pereira & Cuocolo, 1940 is considered synonymous with *M. incognitum* Travassos, 1921; and *M. brevicecum* Ochi, 1930 and *M. pearsei* Goto & Ozaki, 1930 are both considered synonymous with *M. lanceatum* Goto & Ozaki, 1929. *Pintnaria mesocoelium* (Cohn, 1903) Poche, 1907 and *Mesocoelium schwetzi* Dollfus, 1950 are considered synonymous and a new combination, *M. mesocoelium* (Cohn, 1903), is made. A key to the species of *Mesocoelium* is given. E. I. Sillman

1962—CHENG, T. C. & PROVENZA, D. V., 1960. [Department of Biology, Lafayette College, Easton, Pennsylvania, U.S.A.] "Studies on the trematode family Brachycoeliidae III. The sub-families subordinate to the Brachycoeliidae and the status of the genus *Cymatocarpus* Looss, 1899." **American Midland Naturalist**, **63** (1), 162–168.

Cheng & Provenza propose the following natural systematic classification of the family Brachycoeliidae Johnston, 1912 (superfamily Dicrocoelioidea Faust, 1929): (i) subfamily Brachycoeliinae Looss, 1899 with the genera *Brachycoelium* (Dujardin, 1845) Stiles & Hassall, 1898 and *Cymatocarpus* Braun, 1901; (ii) subfamily Leptophallinae Dayal, 1938 with *Leptophallus* Luehe, 1909; (iii) subfamily Glypthelminae Cheng, 1959 with the genera *Glypthelmins* Stafford, 1905, *Margeana* Cort, 1919 and *Reynoldstrema* Cheng, 1959; and (iv) subfamily Mesocoeliinae Dollfus, 1929 with *Mesocoelium* Odhner, 1911 [see also Helm. Abs., **27**, No. 7a & **28**, No. 9a]. The authors advocate deletion of the subfamily Cymatocarpinae Baer, 1924 since *Cymatocarpus* is obviously closely related to *Brachycoelium* and can be accommodated with it in the Brachycoeliinae. The subfamily Orchidasmatinae Dollfus, 1937 is removed from the Brachycoeliidae since the genus it contains, *Orchidasma*, is not considered to be a brachycoeliid. Redefinitions of and a key to the subfamilies Brachycoeliinae, Leptophallinae

and Mesocoeliinae are given. *Cymatocarpus* shows great similarity to *Brachycoelium* but the large cirrus in the former is believed to be sufficiently distinctive to justify the independent status. Abbreviated diagnoses and original illustrations of *Cymatocarpus undulatus* and *C. solearis* are provided. In *C. undulatus*, the cirrus is armed and provided with spinous bursae at its base; the converse is true of *C. solearis*.
E. I. Sillman

- 1963—COIL, W. H. & KUNTZ, R. E., 1960. [Department of Zoology, University of Nebraska, Lincoln, Nebraska, U.S.A.] "Trematodes from Turkey with the descriptions of *Creptotrema mülleri* n.sp. and *Phagicola micracantha* n.sp." **Proceedings of the Helminthological Society of Washington**, 27 (1), 28–32.

Coil & Kuntz describe *Creptotrema mülleri* n.sp. (Allocreadiidae) from kidneys of speckled trout in Lake Abant, and *Phagicola micracantha* n.sp. (Heterophyidae) from the small intestine of *Clemmys caspica rivulata* and *Milvus migrans*, Istanbul. *Creptotrema mülleri* differs from *C. funduli* and *C. creptotrema* by possessing testes in tandem and by the presence of a long, posterior extension which is densely filled with vitelline follicles. *P. micracantha* differs from *P. longicollis* and *P. inglei* most distinctly in size and number of the cephalic spines. Other intestinal trematodes collected from the vicinity of Istanbul were: *Prosotocus confusus* from *Rana ridibunda*, *Chaunocephalus ferox* from *Ciconia ciconia*, *Telorchis solivagus* from *Clemmys caspica rivulata*, *Phagicola longicollis* from *Milvus migrans* and the domestic cat, and *Metagonimus ciureanus* from the domestic cat.
E. I. Sillman

- 1964—DUNAGAN, T. T., 1960. [Department of Biological Sciences, Purdue University, Lafayette, Indiana, U.S.A.] "Cercariae belonging to the Opisthorchioidea." **Proceedings of the Helminthological Society of Washington**, 27 (1), 44–52.

Dunagan has constructed an artificial key for 72 species of cercariae belonging to the Opisthorchioidea. A table is given which includes a list of 95 species of opisthorchioid cercariae together with their authors, hosts and habitats.
B. L. James

- 1965—FOTEDAR, D. N., 1959. [Department of Zoology, S. P. College, Srinagar, Kashmir.] "On a new species of the genus *Ganeo* Klein, 1905 and some notes on the genus." **Journal of Helminthology**, 33 (2/3), 151–160.

Ganeo bufonis n.sp. is described and figured from one specimen obtained from *Bufo viridis* in Harwan, Kashmir. This is the first species of the genus to be recorded from a toad. It differs from all other *Ganeo* species in having both the vitellaria placed on the left side and from individual species by various combinations of morphological characters. Subsequently *G. tigrinum* was also found in *B. viridis* from Kashmir; this species is also described, and *G. kumaonensis* Pande, 1937 and *G. lingnanensis* Li, 1938 are considered to be synonymous with it. The generic diagnosis of *Ganeo* is emended and a key to the species is given.
S. Willmott

- 1966—GUPTA, P. D., 1959. [Central Inland Fisheries Research Station, Calcutta, India.] "On *Haematotrephus* (*Uvitellina*) *kaniharensis* n.sp. (Trematoda: Cyclocoeliidae Kossack, 1911) from Allahabad." **Indian Journal of Helminthology**, Year 1958, 10 (1), 1–5.

Gupta describes and figures *Haematotrephus* (*Uvitellina*) *kaniharensis* n.sp. from the air sacs of *Glottis nebularia* shot at Kanihar near Allahabad. This is a new host and geographical record for this subgenus. The new species is distinguished from all others of the subgenus by the position of the genital pore, which lies in the region of the intestinal bifurcation, and the location of the vitellaria, which are situated in the intracaecal field behind the testes. It differs from all but *H. (U.) dollfusi* in the irregular outline of the testes.
S. Willmott

- 1967—HALL, J. E., 1960. [West Virginia University, Morgantown, West Virginia, U.S.A.] "Studies on virgulate xiphidiocercariae from Indiana and Michigan." **American Midland Naturalist**, 63 (1), 226–245.

Twelve species of virgulate xiphidiocercariae are described. They were found in *Pleurocera acuta* and *Goniobasis livescens* from Wabash and Tippecanoe Rivers, Indiana and in *Goniobasis* sp. from Marquette River, Michigan. Ten species are new. They are *Cercaria tremaglandis* n.sp., *C. papiliogona* n.sp., *C. adoxovirgula* n.sp., *C. neusticoides* n.sp., *C. pyxiceps* n.sp. and *C. cordivirgula* n.sp. all from *P. acuta*; *C. bryobulga* n.sp. from *Goniobasis* sp., and *C. notura*

n.sp., *C. pinguisoma* n.sp. and *C. celatoglandis* n.sp. from *G. livescens*. *C. tranoglandis* Seitner and *C. meringura* Seitner are redescribed. Specific characters include the length and shape of the stylet; the size and shape of the virgula organ; the position, texture and staining reactions of the cephalic glands and the arrangement of their ducts; the shape of the excretory bladder and the flame cell pattern. Observations on potential second intermediate hosts are recorded and a key is given for the 21 species of virgulate xiphidiocercariae of North America.

B. L. James

1968—HALL, J. E., 1960. [Department of Microbiology, Medical Center, West Virginia University, Morgantown, West Virginia, U.S.A.] "Some lecithodendriid metacercariae from Indiana and Michigan." *Journal of Parasitology*, **46** (3), 309–314, 315.

Seven metacercariae are described from aquatic arthropods from streams in Indiana and Michigan. One, from the haemocoel of gomphid naiads, belongs to the genus *Eumegacetes*. Another, *Neoprosthodendrium progeneticum* n.g., n.sp., develops progenetically to full maturity free in the body-cavity of *Hetaerina americana*. This is distinguished from all other genera in the tribe Lecithodendriinae of the Lecithodendriidae by the position of the testes behind the ventral sucker and by the presence of a unique accessory papilla on the ventral surface of the body immediately anterior to the false cirrus sac.

B. L. James

1969—JIMÉNEZ-QUIRÓS, O. & BRENES, R. R., 1958. [Catedra de Helmintología, Facultad de Microbiología, Universidad de Costa Rica.] "Nota sobre el tremátodo *Controrchis caballeroi* Jiménez y Brenes, 1957." *Revista de Biología Tropical. Universidad de Costa Rica*, **6** (2), 189–190. [English summary p. 190.]

On comparison of *Controrchis caballeroi* Jiménez & Brenes, 1957 from *Alouatta palliata* with specimens collected by Price, the authors conclude that this species is synonymous with *C. biliophilus* Price, 1928. Trematodes recovered from *A. p. palliata* and *A. palliata pigra* in Panama and Mexico respectively probably also belong to *C. biliophilus*. Flukes recovered from the liver of *A. palliata* during the outbreak of yellow fever in 1951 in Panama also correspond to the description of this species, which probably parasitizes all howling monkeys throughout Central America and southern Mexico.

N. Jones

1970—KHERA, S., 1958. [Government College, Naini Tal, India.] "*Neascus chelai* nov. sp. (Trematoda) from the fish *Chela clupeoides*." *Anales de la Escuela Nacional de Ciencias Biológicas. Mexico*, **9** (1/4), 85–87. [Spanish summary p. 87.]

Khera describes metacercariae of *Neascus chelai* n.sp. recovered from the integument of *Chela clupeoides*. The metacercariae resembled those of *N. bulboglossa* Van Haitsma in that they lacked an acetabulum, but differed in the presence of an adhesive gland, a genital primordium, a very short oesophagus, a small and different type of adhesive organ and a shallow cup-shaped body.

N. Jones

1971—MANTER, H. W. & PRITCHARD, M. H., 1960. [Department of Zoology, University of Nebraska, Lincoln, Nebraska, U.S.A.] "Some hemiurid trematodes from Hawaiian fishes." *Proceedings of the Helminthological Society of Washington*, **27** (1), 87–102.

Manter & Pritchard briefly discuss the families and subfamilies of the Hemiuroidea, accepting for the most part the taxa proposed by Chauhan (1954). *Plicatrium* n.g. is named for *Lecithochirium lycodontis* Myers & Wolfgang, 1953. *Plicatrium* differs from *Lecithochirium* in its spacious, eversible genital atrium, prostatic cells inside the sinus sac, and the lack of a pre-acetabular pit. *Sterrhurus* is to be differentiated from *Lecithochirium* by the absence of a pre-acetabular pit. The genus *Separogermiductus* Skryabin & Guschanskaya, 1955 is accepted for those species of *Lecithochirium* and *Sterrhurus* which have a large ejaculatory vesicle lined with a smooth, refractive non-cellular wall and includes, in addition to *Separogermiductus inimici*, *S. magnus*, *S. musigarei* and *S. pagrosomi*, the following new combinations: *S. exodictus* (McFarlane, 1936) and *S. genypteri* (Manter, 1954) (both formerly *Lecithochirium*); and *S. macrorchis* (Crowcroft, 1946) and *S. magnatestis* (Park, 1936) (both formerly *Sterrhurus*). Other new combinations proposed are: *Plerurus longicaudatus* (Yamaguti, 1953) and *P. carangis* (Yamaguti, 1942) (both formerly *Lecithochirium*). The following synonyms are proposed: *Sterrhurus floridensis* Manter, 1947 synonym (at least in part) of *S. musculus* Looss, 1907;

Lecithochirium lobatum Yamaguti, 1952 synonym of *Plerurus digitatus* (Looss, 1907); and *L. sinaloense* Bravo-Hollis, 1956 synonym of *L. microstomum* Chandler, 1935. A concept of the Lecithasterinae is proposed to include 30 genera, and the following synonyms made, *Intuscirrus* Acena, 1947 synonym of *Genolinea* Manter, 1925, and *Mordvilkovia*ster Pigulevsky, 1938 synonym of *Lecithaster* Luehe, 1901. Five new species are named and described. *Separogermiductus congeri* n.sp., from *Conger cinereus*, differs from all other species of the genus in the extent of the ecsoma, which reaches half-way or more to the acetabulum, and the testes which are mostly dorsal to the acetabulum. *Sterrhurus goslinei* n.sp., from *C. cinereus*, may be differentiated from all other *Sterrhurus* spp. by the longitudinal aperture of the acetabulum and the presence of a pre-acetabular concavity bordered by conspicuous muscles. *Musculovesicula bilabiata* n.sp., from the same host, is distinguished from *M. gymnothoracis* (the type species) by the pre-oral and oral lobation, the more anteriorly placed genital pore, the more transverse seminal vesicle, and the smaller size of the eggs and presence of filaments on them. *Hysterolecitha tinkeri* n.sp., from *Pomacentrus inornatus* and *Abudefduf abdominalis*, differs from the other species in the genus by having filamented eggs. *Genolinea ampladena* n.sp., from *Acanthurus olivaceus*, is distinct in the possession of a large ovate prostatic vesicle surrounded by a single layer of large cuboidal cells and in the wide acetabulum with a narrow transverse aperture.

E. I. Sillman

1972—SHRIVASTAVA, P. S., 1960. [Zoology Department, College of Science, Raipur, India.] "On a new species of lophocercous cercaria from *Limnaea luteola*." **Indian Journal of Helminthology**, Year 1958, **10** (2), 77–81.

Cercaria luteoli n.sp. is described. It has a dorso-median crest, unpigmented eyespots, three pairs of penetration glands in the middle of the body and a flame cell formula of $2[(2)+(1)]=6$.

B. L. James

1973—SHRIVASTAVA, P. S., 1960. [Zoology Department, College of Science, Raipur, India.] "On three new species of strigeid cercariae from Raipur." **Indian Journal of Helminthology**, Year 1958, **10** (2), 82–96.

Three pharyngeal, longifurcate distome cercariae with unpigmented eyespots, two pairs of antero-lateral penetration gland cells and without a transverse excretory commissure are described. *Cercaria kotai* n.sp. from *Indoplanorbis exustus* has five pairs of caudal bodies and a flame cell formula of $2[2+2+(1)]=10$. *Cercaria rajai* n.sp. from *Limnaea luteola* has no caudal bodies and a flame cell formula of $2[2+1+(2)]=10$. *Cercaria mathpurensis* n.sp. from *I. exustus* has no caudal bodies and a flame cell formula of $2[3+2+(2)]=14$.

B. L. James

1974—SOGANDARES-BERNAL, F. & HUTTON, R. F., 1958. [Florida State Board of Conservation Marine Laboratory, Maritime Base, Bayboro Harbour, St. Petersburg, Florida, U.S.A.] "Studies on helminth parasites from the coast of Florida. IV. Digenetic trematodes of marine fishes of Tampa, Boca Ciega Bays, and the Gulf of Mexico." **Quarterly Journal of the Florida Academy of Sciences**, **21** (3), 259–273.

Pseudopocoelus manteri n.sp., from the pyloric caeca of *Bairdiella chrysurus*, differs from all other species of the genus as the vitellaria extend in front of the acetabulum. It differs from *P. umbrinae* in having smaller testes, an ovary which is never three to four lobed and in its longer prostatic vesicle. A seminal vesicle which extends only slightly posterior to the acetabulum, oblique testes, and a genital pore at the anterior border of the pharynx distinguish *P. manteri* from *P. gibbonsiae*. In *Tormopsolus filiformis* n.sp., from *Rachycentron canadus*, the hermaphrodite duct extends far behind the acetabulum and it is, therefore, unlike the three other species of the genus. The fore-body of *T. filiformis* is twice as long as that of *T. osculatus* and *T. orientalis* and an ovary which is separated from the anterior testis by a band of vitellaria distinguishes it from *T. lintoni*. Three new host records are given: *Rhipidocotyle transversale* from the mid-intestine of *Strongylura timucu*(?), *Bucephaloides bennettii* from the pyloric caeca of *Paralichthys albiguttus*, and *Lecithochirium microstomum* from the stomach of *Coryphaena equisetis* (?) [Sogandares-Bernal & Hutton state that they are in doubt regarding the identity of two of these hosts.] *B. bennettii*, *Manteria brachyderus* and *Stephanostomum imparaspine* are new locality records.

H. H. Williams

Cestodaria

No relevant abstracts in this issue

Cestoda

See also No.: 2104.

- 1975—JOHRI, G. N., 1959. [Department of Zoology, University of Lucknow, India.] "*Vogea vestibularis* n.g., n.sp., a dilepidid cestode for the intestine of the large grey babbler, *Argya malcolmi*." *Journal of Parasitology*, **45** (3), 287–290.

Johri's specimens, which he states were collected from *Argya malcolmi* (a passeriform bird) from the Pilibhit district, U.P., India, are named *Vogea vestibularis* n.g., n.sp. The new form is characterized by 16 triangular rostellar hooks arranged in a double crown and measuring 182μ to 185μ and 69μ to 70μ in length. The cirrus pouch, 338μ to 350μ long, opens directly to the exterior, as does the vagina. There are 9 to 11 testes in front of the ovary and 35 to 40 behind it. The uterus is a persistent lobed sac. A large number of specimens was collected but the range of variation is not indicated. Johri assigns these cestodes to the subfamily Dilepidinae, distinguishing them from other genera by the unilateral genital pores and genital ducts passing dorsal to the excretory vessels, the position of testes, ovary and vagina, the lack of genital atrium and the triangular hooks. There are seven figures and no references.

J. Mahon

- 1976—KOTELNIKOV, G. A., 1960. [The life-cycle of *Fimbriaria amurensis* n.sp. parasitic in domestic ducks.] *Dokladi Akademii Nauk SSSR*, **130** (4), 944–945. [In Russian.]

Up to 70% of domestic ducks in some farms in the Amur area were infected by *Fimbriaria amurensis* n.sp. This new species is described and figured and is differentiated from *F. fasciolaris* by the larger hooks (0.0204–0.0238 mm. in length), by having seven longitudinal excretory ducts (six to eight in *F. fasciolaris*), by the number of testes in the anterior segments (21 to 60 or more) and by the regular oval shape of the oncosphere. Its larvae were found in *Sinodiptomus sarsi*, *Mesocyclops leuckarti* and *Eucyclops serrulatus*, while experimental infection was also successful in Cypridae. The larval development was of the hymenolepid type and infective cysticercoids were obtained within 7 to 12 days. Maturity was reached after nine days in experimentally infected ducklings.

G. I. Pozniak

- 1977—MEYER, F. P. & ULMER, M. J., 1959. "Studies on the cestode genus *Marsipometra* Cooper (Pseudophyllidea: Amphicotyliidae)." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 29–30.

Doubt is cast upon the validity of the three species of *Marsipometra* previously described from *Polyodon spathula*, since gravid worms removed from a live fish differ morphologically from those taken from a fish dead for several hours and the latter migrate rapidly from their normal site. Worms were removed from a live fish and variously treated. Some were refrigerated in river water, physiological saline or host tissue fluid, others were treated in the same way but not refrigerated, while a third group were left in a live fish, at room temperature or refrigerated. The first two groups, except those in saline, became distorted, less so in the refrigerated specimens. In the third group refrigeration caused no distortion but migration was extensive. The specimens from the various groups showed that examples of all three "species" occurred as well as several which might be called new species.

N. A. Hancock

- 1978—RAO, K. H., 1959. [Department of Zoology, University of Leeds, U.K.] "On *Ptychobothrium cypseluri* n.sp. (Cestoda: Pseudophyllidea) from the flying fish, *Cypselurus poecilopterus* caught off Waltair." *Journal of Helminthology*, **33** (4), 267–272.

Rao describes *Ptychobothrium cypseluri* n.sp. from *Cypselurus poecilopterus* off the coast of Andhra Pradesh, India. The new species is differentiated from *P. belones*, the only other known species of the genus, in possessing a deeply lobulate rather than non-lobulate ovary, numerous (55 to 68) rather than few (20) testes, and gravid uterus in the shape of a V-shaped sac rather than a sinuous coil.

E. I. Sillman

1979—SPASSKI, A. A., 1959. [Laboratory of Helminthology, U.S.S.R. Academy of Sciences, Moscow.] "Survey of the zoological system of tapeworms (Cestoda: Cyclophyllidae)." **International Congress of Zoology (15th), London, July 16-23. Proceedings**, pp. 1042-1044.

Spasski classifies, giving synonyms, the order Cyclophyllidea (synonym Aporidea) with three suborders and 12 families, the Tetrabothriata being transferred to the Tetraphyllidea. The three subfamilies of the Anoplocephalidae are given family status and, together with the Catenotaeniidae, are included in the Anoplocephaloidea. The Davaineoidea includes the Davaineidae (synonym Nematoparateniidae) in which two subfamilies are retained, and the Idiogenidae. The Hymenolepidoidea contains the Hymenolepididae (including *Gastrotaenia*), Dilepididae and Paruterinidae. The Nematotaenioidea contains one family and these four superfamilies are included in the suborder Anoplocephalata. The second and third suborders, Taeniata and Mesocestoidata contain one family each. The aberrant Acoleidae, Amabiliidae and Dioicocestidae are placed in the Hymenolepidoidea. J. Mahon

Acanthocephala

See also No.: 2323.

1980—GRACIA RODRIGO, A., 1960. "Contribución al conocimiento de los acantocéfalos parásitos de los peces en Venezuela." **Revista Veterinaria Venezolana**, 8 (42), 3-32. [English summary p. 30.]

Three males and five females of *Echinorhynchus ungriai* n.sp. were recovered from the intestine of a *Potamotrygon hystrix* in the State of Apure (Venezuela) in 1957. The proboscis of the new species resembles most closely those of *E. alpinus* and *E. campbelli*. From the former *E. ungriai* differs by the absence of sexual dimorphism and from the second by the larger body size. The new species differs from the remaining species in the genus by the much smaller size of the hooks. A brief description of the other 22 species of Echinorhynchidae is given. This is the first record of this family in Venezuela. Descriptions are also given of *Quadrigyus torquatus* Van Cleave, *Q. cholodowskyi* Kostilev, *Q. brasiliensis* Machado, *Acanthodelta scorzai* (Díaz-Ungria & Gracia, 1957) and *Pandosentis iracundus* Van Cleave. N. Jones

Nematoda

See also Nos.: 1676, 2090, 2139, 2321.

1981—ANDERSON, R. C., 1959. [Ontario Research Foundation, 43 Queens Park, Toronto 5, Canada.] "Preliminary revision of the genus *Diplotriaena* Henry and Ozoux, 1909 (Diplotriaenidae: Diplotriaeninae)." **Parassitologia. Rome**, 1 (3), 195-307.

Anderson presents a preliminary revision of the genus *Diplotriaena* Henry & Ozoux, 1909 and gives detailed descriptions of 30 species, of which six are new, and regards 36 species as synonymous. The value of characters in the delimitation of the species is considered in detail and it is concluded that the tridents, the form of the right spicule and the stoma (when a cuticular ring is present) supply very good characters; that the form of the oesophagus, and of the male tail supply characters which should only be accepted with some reservations; that the form of the cuticle and the lateral line (=chord, =field) is of little or no value; and that the arrangement of the cephalic papillae is constant throughout the genus. The six new species are: *D. campanae* n.sp. from *Lamprotornis australis* (type host), *Lamprocolius purpureus* and *L. chalybeus* (Africa), characterized by short, bluntly pointed tridents and a double row of bulging papillae on the laterally expanded male tail; *D. chabaudi* n.sp. from *Prinia gracilis lepida* (India), characterized by a long, untwisted right spicule similar in form to the left, short tridents and wing-like expansions on the male tail; *D. dollfusi* n.sp. from *Trochalopteron canorus* (China), characterized by the left spicule with a handle-like bend at the proximal end and a long trident; *D. golvani* n.sp. from *Dicrurus bracteatus assimilis* (New Guinea), characterized by a very small, untwisted right spicule; *D. leiperi* n.sp. from *Lissotis m. melanogaster* (Africa), characterized by the large blunt tridents and an unusually broad right spicule; *D. urocissoides* n.sp. from *Urocissa melanocephala occipitalis* (India), characterized

by smooth tridents with rounded apices, an undivided oesophagus and a slightly expanded male tail with four pairs of papillae. The 24 species which are accepted as valid are: *D. ozouxi*, *D. agelaius*, *D. americana*, *D. bargusinica*, *D. bhamoensis*, *D. corrugata*, *D. couturieri*, *D. ecaudata*, *D. epsilon*, *D. falconis*, *D. flabellata*, *D. obtusa*, *D. pungens*, *D. serratospicula*, *D. sokolowi*, *D. spermospizae*, *D. thomasi*, *D. tocki*, *D. tricuspis*, *D. tridens*, *D. unguiculata*, *D. alpha*, *D. graculi* and *D. zeta*. The remaining species assigned to the genus are listed and it is proposed that the names *D. obtuso-caudata* (Rudolphi, 1819), *D. abbreviata* (Rudolphi, 1819) and *D. tridentis* Walton, 1927 should not be treated as referable to the genus *Diplotriaeana*. A key is given to the species described and full critical synonymies are given for all the species. Finally, the species of *Diplotriaeana* are listed under the avian families which they parasitize, and it is concluded that many species are not very host-specific. The report is illustrated by 29 pages of figures.

W. G. Inglis

1982—ANDRÁSSY, I., 1959. [Institut für Tiersystematik der Universität. Budapest, Hungary.] "Ergebnisse der zoologischen Aufsammlungen des Ungarischen Naturwissenschaftlichen Museums in Ägypten im Jahre 1957. 3. Einige Nematoden aus dem Roten Meer." **Annales Historico-Naturales Musei Nationalis Hungarici**, **51**, 247–257.

Six species of marine nematodes are described and figured: *Eurystomina retrocellata*, *Nygmatonchus scriptus*, *Chromadora* sp., *Spilophorella euxina*, *Bathylaimus* aff. *australis*, and *Steineria aegyptica* n.sp. The last is closest to *S. punctata* but differs in the absence of cuticular punctation, in the greater number of relatively shorter subcephalic setae, in the smaller amphids, and in the larger spicules. Andrassy points out that *Eurystomina* is a Latin feminine name, not a Greek neuter.

R. W. Timm

1983—ANDRÁSSY, I., 1959. "Neue und wenig bekannte Nematoden aus Jugoslawien." **Annales Historico-Naturales Musei Nationalis Hungarici**, **51**, 259–275.

In various samples of soil and moss from the mountains of Yugoslavia, Andrassy found twenty-four species of nematodes of which five are new and these are described and figured, together with notes on some of the other species found. The new ones are: *Paratylenchus microdorus* n.sp., distinguished by its slender spear; *Aphelenchoides nonveilleri* n.sp., which has a relatively longer spear than *A. fragariae* and a star-shaped mucro; *Dorylaimus kaszabi* n.sp., differs from *D. intermedius* in being smaller and fatter and from *D. propinquus* in the relatively shorter spear opening and the fewer pre-anal supplements; *Dorylaimellus montenegricus* n.sp., has a longer tail than *D. nodochordus*, *D. parvulus* and *D. tenuidens*; *Dorylaimoides venustus* n.sp., is close to *D. conurus* but has a much shorter tail.

J. B. Goodey

1984—ANDRÁSSY, I., 1959. [Institut für Tiersystematik der Universität, Budapest, Hungary.] "Was ist Dadays Nematoden-Art *Pseudochromadora quadripapillata*?" **Opuscula Zoologica. Instituti Zoosystematici Universitatis Budapestinensis**, **3** (2), 51–55.

In 1922 Micoletzky considered *Pseudochromadora quadripapillata* Daday, 1899 to be a *species inquirenda*. Andrassy now redescribes and figures it from the holotype female still extant in Daday's collection of nematodes. *Micromicron cephalatum* Cobb, 1920 is made a synonym. The species belongs in the Desmodorinae.

J. B. Goodey

1985—ANDRÁSSY, I. & COMAN, D., 1959. "Eine—vermutlich neue—*Meloidogyne*-Art (Nematoda) aus einer Wasserleitung." **Opuscula Zoologica. Instituti Zoosystematici Universitatis Budapestinensis**, **3** (2), 57–60.

Andrassy & Coman describe a single male *Meloidogyne* found in the filtrate from the mineral baths at Bad Herkules, Rumania. The water came from a covered concrete cistern fed with well water. The nematode, which was alive and well preserved, was found in March when the surrounding countryside was snow-covered. It differs from other described species of the genus in having the lip annule secondarily divided, a heavily chitinized head skeleton, a long, narrow oesophageal bulb ($33.5 \times 13.0 \mu$), large spicules (44.5μ) and a relatively slender body ($a=61.5$). It is assumed to be a new species but is not named.

M. T. Franklin

1986—BIOCCA, E., 1959. [Istituto di Parassitologia dell'Università di Roma, Italy.] "Considerazioni sulla sistematica di Trichostrongyloidea degli edentati i descrizione di una nuova specie." *Parassitologia. Rome*, 1 (2), 169–181. [English summary p. 180.]

Biocca describes *Manistrongylus rousseloti* n.sp. from the intestine of a pangolin (*Manis tricuspis*) from the Zoological Gardens, Brazzaville. The species is characterized by a very long body, the presence of pre-bursal papillae and an accessory cloacal bursa (?), the form of the bursa, long spicules and gubernaculum, 240–260 μ by 140–160 μ respectively. The genera of the Trichostrongyloidea occurring in the intestine of edentates are listed with diagnoses: *Delicata* Travassos, 1935, *Macielia* Travassos, 1935, *Angulocirrus* Biocca & leRoux, 1957, *Trichocheenia* Kou, 1958, *Pholidostrongylus* Baer, 1959, and *Manistrongylus* Baer, 1959.

W. G. Inglis

1987—BRZESKI, M., 1960. "*Andrássya vivipara* gen.nov., sp.nov. (Nematoda: Tripylidae)." *Bulletin de l'Académie Polonaise des Sciences. Classe II. Série des Sciences Biologiques*, 8 (2), 81–84.

Andrássya vivipara n.g., n.sp. is described and figured. It occurred on submerged plants in small bodies of water in Poland. Brzeski discusses the position of the new genus and separates it from (i) *Tobrilus* [= *Trilobus* Bastian] and (ii) *Tripyla* by (a) the possession of a feebly developed buccal cavity and (b) the pyriformly dilated terminus of the oesophagus and the possession of separate spicules, respectively.

J. B. Goodey

1988—BUCKLEY, J. J. C., 1960. [London School of Hygiene and Tropical Medicine, London, W.C.1.] "On *Brugia* gen.nov. for *Wuchereria* spp. of the 'malayi' group, i.e. *W. malayi* (Brug 1927), *W. pahangi* Buckley & Edeson, 1956, and *W. patei* Buckley, Nelson & Heisch, 1958." *Annals of Tropical Medicine and Parasitology*, 54 (1), 75–77.

Buckley proposes to remove *Wuchereria malayi*, *W. pahangi* and *W. patei* from the genus *Wuchereria* and to place them in a separate genus, *Brugia* n.g., which is defined. The designation of the new genus is in honour of the discoverer of *Microfilaria malayi*. *Brugia* is characterized and differentiated from *Wuchereria* by the complex centre section of the left spicule (simple in *Wuchereria*), the relatively small number of caudal papillae (there being typically four pairs of ventro-laterals, two post-anals, one large pre-anal and two near the tip of the tail whereas in *Wuchereria* there are typically 9–12 pairs of ventro-laterals and four near the tail tip in addition to the two post-anals and single pre-anal), and the relatively small size (slightly more than half that of *Wuchereria*). The microfilariae of the three species of *Brugia* are all alike and quite distinct morphologically from those of *Wuchereria*. A tabular figure sets forth the main differences in hosts, geographical distribution, microfilariae, spicules, male tail and adult size.

J. M. Watson

1989—CHABAUD, A. G., 1959. [Institut de Parasitologie, Université de Paris, Faculté de Médecine, Paris, France.] "Sur la systématique des nematodes proches de *Spirocerca lupi* (Rud., 1809)." *Parassitologia. Rome*, 1 (2), 129–135.

Chabaud describes the structure of the head in the species of habroneme nematodes parasitic in carnivores and as a result draws attention to the difficulty of proposing a satisfactory classification of the group. He recognizes five genera: (i) *Didelphonema*, with one species; (ii) *Vigisospirura* (of which the type species is renamed *V. potekhinae* because the original name is preoccupied); other species (all from *Cyathospirura*) are *V. grimaldiae* n.comb., *V. skrijabini* (sensu Chernikova, 1934) n.comb., and *V. whitei* n.comb.; Chabaud suggests that *Chlamydo-procta itascensis* Chandler, 1954 may be related to the species of *Vigisospirura*; (iii) *Cyathospirura* with *C. chevreuxi*, *C. nouveli* and *C. seurati*; (iv) *Spirocerca* with *S. lupi* and *S. vigisiana*; (v) *Cylicospirura* with *C. subaequalis*, *C. arctica* n.comb. (from *Spirocerca*), *C. heydoni* n.comb. (from *Anoplostongylus*), *C. petrowi* n.comb. and *C. strasseni* n.comb. (from *Skrjabinocerca* and *Gastronodus* respectively which are considered to be synonyms of *Cylicospirura*). *Petrospirura lynxii* is considered a synonym of *Cylicospirura subaequalis*. The validity of *Cyathospirura seurati* Gibbs, 1956 is discussed and it is accepted provisionally.

W. G. Inglis

1990—ESSER, R. P., 1960. [State Plant Board of Florida, Gainesville, Florida, U.S.A.] "Three additional species in the genus *Hemicriconemoides* Chitwood & Birchfield 1957 (Nematoda: Tylenchida)." *Nematologica*, 5 (1), 64–71. [German summary pp. 70–71.]

Three new species of *Hemicriconemoides* are described and figured from Florida. *H. chitwoodi* n.sp. (male and female) has a longer female spear with rounder basal knobs than *H. gaddi* and the male has two more incisures; it occurred in the soil about the roots of *Camellia* sp. *H. minutus* n.sp. (female) has a longer spear and fewer sheath annules than *H. brachyurus* and occurred about the deep roots of *Carya glabra* var. *megacarpa*. *H. strictathecatus* n.sp. (female) is unique in having spheroid spear knobs and its lip region being offset as a single disc-shaped annule. This last species occurred about the roots of *Cocos nucifera*. The author suggests that the genus is closer to *Criconemoides* than *Hemicyclophora* and comments on the presence of the sheath and the process of moulting. J. B. Goodey

1991—FORSTNER, M. J., 1960. [Zoologisch-Parasitologisches Institut, München 22, Veterinärstr. 13, West Germany.] "Ein Beitrag zur Kenntnis parasitischer Nematoden aus griechischen Landschildkröten." *Zeitschrift für Parasitenkunde*, 20 (1), 1–22.

Forstner reports on the nematode parasites found in *Testudo hermanni*. They were: *Tachygonetria longicollis* Schneider, 1866; *Oxyuris robusta* Drasche, 1883; *O. dentata* Drasche, 1883; *Mehdiella microstoma* (Drasche, 1883); *M. inflata* Drasche, 1883; *Atractis dactylura* Dujardin, 1845; *Angusticaecum holoptera* Rudolphi, 1819, all of which are redescribed; and *T. testudinis* n.sp. (characterized by a relatively short oesophagus and a very short spicule); *M. hamosa* n.sp. (males only; posterior end of spicule split and tip of male tail lobed dorsally); *M. cordata* n.sp. (males only; spicule split posteriorly, male tail without dorsal lobe); *O. lata* n.sp. (females only; anterior portion of the oesophagus swollen); *Macracis papillosa* n.sp. (females only; mouth opening slit-like with two large papillae on each lip and female tail with an asymmetrical lanceolate internal structure at the tip); *Alaeuris forcipiformis* n.sp. (males and females; ad-anal papillae on male tail characteristically curved, small valve over vulvar opening). The report is illustrated by photographs and figures. W. G. Inglis

1992—FREITAS, J. F. TEIXEIRA DE, 1959. "Esbôço de novo arranjo sistemático para os Nematódeos Capilariíneos (Trichuroidea)." *Atas da Sociedade de Biologia do Rio de Janeiro*, 3 (5), 4–6.

Freitas proposes a new classification for the Capillariinae, which will now comprise the following genera: *Gessyella* n.g., the type species of which is *G. latridopsis* n.comb. (for *Capillaria latridopsis*); *Pterothominx* n.g., with type species *P. meleagris-gallopavo* n.comb. (for *Trichosomum meleagris-gallopavo*); *Pseudocapillaria* n.g., represented by *P. bakeri* n.comb. [for *Hepaticola bakeri* Mueller & Van Cleave, 1932] as type species; *Ritaklossia* n.g., with type species *R. penidoi* n.comb. [for *Capillaria penidoi*]. Also included are: *Anchothea*, *Skrijabinocapillaria*, *Capillostrongyloides*, *Capillaria*, *Thominx* and *Hepaticola*. M. McKenzie

1993—FREITAS, J. F. TEIXEIRA DE & MACHADO DE MENDONÇA, J., 1959. "Nota prévia sobre uma nova espécie do gênero *Graphidiops* Lent & Freitas, 1938 (Nematoda, Strongyloidea)." *Atas da Sociedade de Biologia do Rio de Janeiro*, 3 (5), 1–3.

Graphidiops assimilis n.sp. is described from *Myrmecophaga tridactyla* from Brazil. Compared with the most closely related species, *G. dissimilis*, the male armature of the new species has a different appearance, the ovejector and vulva appendage are smaller and there are no cuticular thickenings in the female. M. McKe zie

1994—FREITAS, J. F. TEIXEIRA DE & MACHADO DE MENDONÇA, J., 1959. [Instituto Oswaldo Cruz, Rio de Janeiro, D. F., Brazil.] "Novo gênero de Graphidiinae Travassos, 1937 (Nematoda, Strongyloidea)." *Revista Brasileira de Biologia*, 19 (4), 387–392.

Freitas & Mendonça describe a new trematode *Paragraphidium pseudosexradiatum* n.g., n.sp., from the stomach of *Myrmecophaga tridactyla* in Brazil. The new genus is similar to *Graphidium* Railliet & Henry, 1909 but differs from it in that the body does not narrow abruptly just posterior to the vulva, the anterior and posterior externo-lateral rays of the bursa do not reach the margins of the bursa and the branches of the ovejector are unequal. W. G. Inglis

1995—GERLACH, S. A., 1957. [Zoologisches Institut der Universität Kiel, Hegewisdistr. 3, Kiel, West Germany.] "Marine Nematoden aus den Mangrove-Gebiet von Cananéia (Brasilianische Meeres-Nematoden III)." *Abhandlungen der Mathematisch-Naturwissenschaftlichen Klasse. Akademie der Wissenschaften und der Literatur, Mainz*, No. 5, pp. 131-176.

Gerlach describes and figures 33 species of free-living marine nematodes from the mangrove region of Cananéia, São Paulo, Brazil, of which nine species are new. *Anoplostoma subulatum* n.sp. differs from the group of species with long thin spicules by its shorter cephalic setae. *Paracyatholaimus vitraeus* n.sp. is distinguished by its shorter cephalic setae, small amphids and spicules, and weak pre-anal supplements. *Microilaimus capillaris* n.sp. has very thin spicules 100μ long. *Metachromadora clavata* n.sp. differs from *M. spiralis* through its larger amphids and its pre-anal supplements. In *Pseudolella intermedia* n.sp. the ventral arm of the amphids extends to the base of the oesophagus. *Anonchus mangrovi* n.sp. has nine complex pre-anal supplements; a key to the genus is given. *Paraphanolaimus cantor* n.sp. differs from the type species by its larger stoma and amphids and longer cephalic setae. *Leptolaimus surdus* n.sp. is distinguished by its shorter stoma and lack of amphids. *Prosphaerolaimus trochus* n.sp. differs from the other short-tailed species by its smaller size and the presence of one pre-anal supplement; a key to the genus is given. *Diplolaimella chitwoodi* nom.nov. is a new name for *D. ocellata* Chitwood nec Bütschli. R. W. Timm

1996—GUPTA, S. P., 1960. [Institute of Parasitology, McGill University, Macdonald College P.O., Quebec, Canada.] "Nematode parasites of vertebrates of East Pakistan. IV. Ascaroid nematodes from amphibia, birds, and mammals." *Canadian Journal of Zoology*, 38 (2), 315-329.

Gupta describes three new species of nematode and redescribes four species from hosts from Dacca, East Pakistan. *Porrocaecum* (P.) *haliasturi* n.sp. from a kite (*Haliastur indus* is characterized by the shape of the lobes of the lip pulp, which bear two flattened expanded processes, by the eggs not being thickened at the poles, and by the position of the vulva. *Aplectana agubernaculum* n.sp. from *Rana tigrina* is characterized by not having a gubernaculum, by the arrangement of the caudal papillae and the size of the spicules and the tail. *A. asiatica* n.sp. from *R. tigrina* and *Bufo melanostictus* is characterized by a gubernaculum, the anterior position of the vulva, the arrangement of the caudal papillae and the size of the tail. *Contra-caecum* (C.) *haliaeii* (Baylis & Daubney, 1923), *Toxocara mystax* (Zeder, 1800), *Heterakis spumosa* (Schneider, 1866), *H. beramporia* (Lane, 1914), and *Meteterakis govindi* Karve, 1930 are redescribed. *H. spumosa* was from a cat and "It is possible, however, that the cat in this instance was parasitized after ingestion of infected rats". W. G. Inglis

1997—KHERA, S., 1959. [University of Gorakhpur, Gorakhpur, India.] "On a new species of *Cosmocercoides*." *Indian Journal of Helminthology*, Year 1958, 10 (1), 6-12.

Khera describes *Cosmocercoides multipapillata* n.sp. from the rectum of *Bufo melanostictus* at Jeolikote, Naini Tal, together with specimens of an *Oswaldocruzia* species. The new species is most similar to *C. variabilis* (Harwood, 1930) and *C. bufonis* Karve, 1944 but differs from both in having papillae dorsally, ventrally and laterally over the whole body, in the form of the lips and the number of the papillae on the male tail. W. G. Inglis

1998—KLOSS, G. R., 1959. "Nematóides parasitos de baratas." *Atas da Sociedade de Biologia do Rio de Janeiro*, 3 (5), 6-9.

Among the nematodes parasitic in cockroaches, Kloss creates a new subfamily and describes a new genus and new species. *Protrelletinae* n.subf. of the Hystrignathidae contains the genus *Protrellata* and is characterized by the position of the vulva in front of the base of the oesophageal bulb, by the blunt tail with a dorsal cuticular thickening in the male and the absence of a spicule. *Napolitana* n.g., in the Protrelloidinae, is distinguished from the other genera which have the vulva in front of the bulb by its smooth eggs which have no operculum. *Napolitana* includes (i) *N. galebi* n.comb. [for *Protrellus galebi* Schwenk, 1926] the type species, and (ii) *N. australasiae* n.comb. [for *Oxyuris australasiae* Pessôa & Corrêa, 1926] of which *Protrellina phyllochromi* is a synonym. *Protrelleta labrumspinosa* [also spelt *lambruspinosa*] n.sp. from a cockroach from Brazil is described from the female only and is therefore provisionally placed in the Protrelletinae; its eggs are operculate and the vulva is at the base of the isthmus. M. McKenzie

1999—LUC, M., 1958. [Laboratoire de Nématologie de l'Institut d'Enseignement et de Recherches Tropicales d'Abidjan—Côte d'Ivoire, French West Africa.] "Les nématodes et le flétrissement des cotonniers dans le sud-ouest de Madagascar." *Coton et Fibres Tropicales*, Paris, 13 (2), 239–256.

Luc found *Criconemoides citri*, *Helicotylenchus nannus* and *Hemicyclophora membranifer* in soil and *Pratylenchus delatrei* n.sp. female and *Hoplolaimus seinhorsti* n.sp. female in roots and soil in conjunction sometimes with a parasitic wilt of cotton associated with *Fusarium* spp. in Madagascar. He considers that the last two species might facilitate the fungal attack: both are described and figured. *P. delatrei* differs from *P. thornei* by its smaller size, its regularly rounded tail and the absence of post-vulval narrowing of the body, from *P. subpenetrans* by the absence of males, and from *P. zae* by the more posterior vulva and the greater development of the head framework. *P. dellatrei* also attacked roots of *Zea mays*, *Sorghum vulgare*, *Abutilon asiaticum* and *Corchorus acutangulus*. *H. seinhorsti* differs from *H. coronatus* in the absence of the lateral field, absence of males and spermathecae, and from *H. proporicus* (which it resembles regarding its excretory pore) by having the basal head annules divided into areolae and the presence of six nuclei in the oesophageal gland diverticulum. J. B. Goodey

2000—LUC, M., 1960. [Office de la Recherche Scientifique et Technique Outre-Mer, Institut d'Enseignement et de Recherches Tropicales, Abidjan Côte d'Ivoire, Africa.] "*Dolichodorus profundus* n.sp. (Nematoda—Tylenchida)." *Nematologica*, 5 (1), 1–6. [English summary p.6.]

Dolichodorus profundus n.sp. is described and figured. It is characterized by having only four cushion-shaped lips offset by a very broad and deep groove and the cuticle of the anterior part of the body is areolated. The excretory system has a very long uninucleate cell in the left subventral position; this was also seen in *D. heterocephalus*. The nematode occurred in sandy soil growing coconuts in Togo at about 1 m. depth and never in the upper layers of the soil. Other plant-parasitic nematodes were more prevalent in these upper layers.

J. B. Goodey

2001—LUC, M., 1960. [Office de la Recherche Scientifique et Technique Outre-Mer, Institut d'Enseignement et de Recherches Tropicales, Abidjan, Côte d'Ivoire, Africa.] "Trois nouvelles espèces du genre *Rotylenchoides* Whitehead, 1958 (Nematoda—Tylenchida)." *Nematologica*, 5 (1), 7–17. [English summary pp. 16–17.]

Three new species of *Rotylenchoides* are described and figured. *R. intermedius* n.sp. (male and female) differs from *R. brevis* in the more anterior vulva, the less degenerate posterior gonad and shorter spicules. *R. variocaudatus* n.sp. (female) has a conical tail, phasmids at the mid-point of the tail and four incisures to just short of the tail tip. *R. affinis* n.sp. (female) also has a conical tail but phasmids just post-anal and inner incisures fused over the last half of the tail. *Rotylenchoides* is placed in *Hoplolaiminae* and its diagnosis modified so that the posterior ovary is said to be degenerate or a post-vulval sac. A key is given to the four species in the genus and a footnote makes comparison with *Hoplolytus* s' Jacob (1959). All three species occurred in the Ivory Coast, *R. intermedius* on the roots of *Drypetes aylmeri*, *R. variocaudatus* in soil around the roots of *Pipe nigrum* and *Albizia* sp. and *R. affinis* similarly around roots of *Coffea* sp.

J. B. Goodey

2002—METTRICK, D. F., 1959. [University College of Rhodesia & Nyasaland, Zoology Department, Private Bag 167 H, Salisbury, Southern Rhodesia.] "On the nematode genus *Capillaria* in British birds." *Annals and Magazine of Natural History*, Series XIII, 2 (14), 65–84.

Descriptions are given of 13 species of *Capillaria* Zeder, 1800. Those of *C. ovopunctata* (v. Linstow, 1873), *C. exilis* (Dujardin, 1845), *C. obsignata* Madsen, 1945, *C. nyrocinorum* Madsen, 1945, *C. tenuissima* (Rudolphi, 1803) and *C. triloba* (v. Linstow, 1890) are the first since the original descriptions. Mettrick considers that *C. dujardini* Travassos, 1915 is a synonym of *C. columbae* (Rudolphi, 1819), and that *C. retusa* (Railliet, 1895) and *C. collaris* (v. Linstow, 1873) are two distinct species. The systematic value and constancy of certain diagnostic characters is discussed. Four new host records and ten new records for Britain are reported. D. F. Mettrick

- 2003—PERRY, V. G., DARLING, H. M. & THORNE, G., 1959. "Anatomy, taxonomy and control of certain spiral nematodes attacking blue grass in Wisconsin." **Research Bulletin. University of Wisconsin**, No. 207, 24 pp.

The taxonomy of *Rotylenchus*, *Helicotylenchus*, *Gottholdsteiniera* and *Scutellonema* is discussed and *Gottholdsteiniera* denoted as a synonym of *Helicotylenchus*. In *Helicotylenchus* the junction of oesophagus and intestine is figured as an ovoid chamber with a small sphincter muscle just before the terminus of the oesophageal lumen. Five oesophageal gland nuclei have been observed. A renette cell is figured terminating the duct from the excretory pore [but no longitudinal ducts are shown]. *H. nannus* has lateral flaps at the vulva. Four new species are described and figured, viz., *Helicotylenchus digonicus* n.sp. Perry, 1959 (female) differs from *H. nannus* in possessing a hemizonid, three or four head annules and in the shape of the spear base. *H. microlobus* n.sp. Perry, 1959 (female) differs from *H. erythrinae* and *H. melancholicus* in being a digonic hermaphrodite (the other two have spermathecae and males). *H. platyurus* n.sp. Perry, 1959 (female) is unique in having a broadly rounded tail. *H. pumilus* n.sp. Perry, 1959 (male and female) has a short posterior part of the oesophagus and is bisexual. Section II deals with the effects of *H. digonicus*, *H. pumilus* and *H. microlobus* on *Poa pratensis*. The damage is figured and it is suggested that *H. digonicus* may cause severe root disease; the status of the other two nematodes is more doubtful. Control of nematodes in turf by dichlorophenyl-diethyl-phosphorothioate (V.C.13) and dibromochloropropane (Nemagon EC-2) was obtained by drenching turf and improved the grass growth. [The new species should apparently be quoted as Perry in Perry, Darling & Thorne, 1959.] J. B. Goodey

- 2004—PETROV, A. M. & SADIKHOV, I. A., 1957. [*Trichocephalus cutcasheni* n.sp. from the intestine of *Sciurus persicus* in Azerbaidzhan.] **Dokladi Akademii Nauk Azerbaidzhanskoi SSR**, 13 (1), 69–71. [In Russian.]

Trichocephalus cutcasheni n.sp. is described and figured from *Sciurus persicus* from Azerbaidzhan. It differs from the one other species of this genus, *T. megalon*, which is found in squirrels in the following characters: the relative length of the narrow oesophageal part and the wider posterior portion of the body in the female (21–22 mm. and 9–12 mm. respectively as opposed to 23 mm. and only 4.2 mm. in *T. megalon*); the length of the eggs (0.048–0.057 mm. as opposed to 0.08 mm. and over in *T. megalon*). The spicule length of the new species (2.5–2.8 mm.) brings it near to *T. opaca* and *T. petrowi* parasitic in rodents; in these species, however, the oesophageal portion of the body is equal in length to the posterior portion and the eggs are larger. G. I. Pozniak

- 2005—PRICE, D. L., 1959. [Walter Reed Army Institute of Research, Washington, D.C., U.S.A.] "*Dirofilaria magnilarvatum* n.sp. (Nematoda: Filarioidea) from *Macaca irus* Cuvier. I. Description of the adult filarial worms." **Journal of Parasitology**, 45 (5), 499–504.

Price describes a new species of nematode, *Dirofilaria magnilarvatum*, from the subcutaneous tissue of *Macaca irus* from Pahang, Malaya and from the same host in captivity in the U.S.A., probably originally from Malaya. The species is characterized by microfilariae which are about 580 μ long, the fact that the posterior end of the male bears 12 pairs of papillae and three median papillae, that the tip of the left spicule is split and covered by a membrane and that the female has large extra-oesophageal glands. W. G. Inglis

- 2006—SADIKHOV, I. A., 1957. [A new species of nematode, *Petrowospirura petrowi* n.sp., from the intestine of *Felis chaus* in Azerbaidzhan.] **Dokladi Akademii Nauk Azerbaidzhanskoi SSR**, 13 (8), 901–904. [In Russian.]

Sadikhov describes and figures *Petrowospirura petrowi* n.sp., a male and a female of which were recovered from the intestine of *Felis chaus* in Azerbaidzhan. The new species differs from the only other species in the genus, *P. lynxi*, in the size of the spicules (left 1.6 mm. and right 0.38 mm. in length), of the gubernaculum (0.052 mm. in length and 0.063 mm. in width), and of the eggs (0.040–0.042 \times 0.021–0.023 mm.). G. I. Pozniak

2007—SCHAD, G. A., 1960. [Institute of Parasitology, McGill University, Macdonald College P.O., Quebec, Canada.] "The genus *Thelandros* (Nematoda: Oxyuroidea) in North American salamanders, including a description of *Thelandros salamandrae* n.sp." **Canadian Journal of Zoology**, 38 (1), 115–120.

Schad describes *Thelandros salamandrae* n.sp. from *Aneides hardii*, in New Mexico. "*Oxyuris*" *dubia* of Lehmann (1954) is considered to be this species and *T. salamandrae* may be distinguished from *T. magnavulvaris* (Rankin, 1937), known only from females, by the lack of a prominent vulva and the lack of a capsule in the egg; and from *T. minutus* Read & Amrein, 1952 by the number and distribution of the caudal papillae in the male. *T. salamandrae* has two pairs of pre-cloacal papillae followed by two post-cloacal double papillae on the ventral mid-line; the proximal end of the spicule is a bent narrow tube which joins a median bulbous part which in turn leads to an elongate distal point. The larva (pre-adult female = ? fourth stage) of the new species is plump with a spiny cuticle and four to seven large tail spines.
W. G. Inglis

2008—s'JACOB, J. J., 1959. [Landbouwhogeschool, Wageningen, Netherlands.] "*Hoplotylus femina* n.g., n.sp. (Pratylenchinae: Tylenchida) associated with ornamental trees." **Nematologica**, 4 (4), 317–321. [German summary p. 320.]

Hoplotylus femina n.g., n.sp. (female only) is described, figured and placed in the Pratylenchinae. A long glandular lobe of the oesophagus overlaps the intestine, the vulva is at about 86% with a shortish anterior, outstretched gonad and a mere stub of a post-vulval-sac. The tail is about three anal-body-widths long, conical to a point with irregular coarse striae not extending round the tip. The phasmids are just post-anal. The lateral fields have four incisures. It was found in and around roots of *Picea abies* and *Chamaecyparis lawsoniana* in Holland.
J. B. Goodey

2009—TIMM, R. W., 1957. [Notre Dame College, Dacca 2, East Pakistan.] "New marine nematodes from St. Martin's Island." **Pakistan Journal of Scientific Research**, 9 (4), 133–138.

Timm describes and figures one new genus, four new species, and one new variety of free-living marine nematodes from St. Martin's Island, Bay of Bengal, East Pakistan. *Pseudolelloides bengalensis* n.g., n.sp. is said to differ from *Pseudolella* in the presence of an oesophageal bulb and in the nature of the three massive odontia of the stoma. *Paracanthonchus tumepapillatus* n.sp. is distinguished from all other species by the form of the stoma and by the presence of three mamilliform pre-anal supplements in the male, with an internal setose innervation. *Camacolaimus bulbosus* n.sp. has a well defined oesophageal bulb and 11 pre-anal ventral papillae. *Steineria pilosa* var. *brevisetosa* n.var. differs from the typical form in the relatively much shorter subcephalic setae and tail spines, and in the more anterior position of the amphids. *Theristus* (*Mesotheristus*) *sancti-marteni* n.sp. differs from *T. setosus* and *T. hirtus* in the longer cephalic setae, more posterior amphids, absence of somatic setae, and the presence of knobs on the spicules.
R. W. Timm

2010—TIMM, R. W., 1959. [Notre Dame College, Dacca 2, East Pakistan.] "A new species of *Pharyngonema* (Nematoda: Pharyngonematidae) from the body cavity of earthworm." **Pakistan Journal of Biology and Agricultural Science**, 2 (1), 42–46.

Pharyngonema pheretimae n.sp. is described and figured. It is a parasite of the coelom of *Pheretima posthuma*. Various reasons are presented for identifying the genus with *Pharyngonema pierantoni*, and an emendation of the genus is given. The oesophagus is short, muscular and slightly panduriform, just anterior to the nerve ring. The stoma opens through a sclerotized ring with three sclerotized plates resembling the "retorse onchia" of *Rhigonema* just posterior to it. The terminal excretory duct is vesicular. The genital apparatus is double and the vagina muscular. One male larva with large papillar supplements was found. The phasmids are tiny and pore-like. The subfamily Pharyngonematinae is raised to family status and transferred from the superfamily Drilonematoidea to the superfamily Oxyuroidea. This is the first report of an oxyuroid parasite of earthworms.
R. W. Timm

- 2011**—TIMM, R. W., 1959. [Notre Dame College, Dacca 2, East Pakistan.] "Observations on *Synoechnema* (Nematoda, Ungellidae), with a description of two new species." **Pakistan Journal of Scientific Research**, 11 (2), 58–62.

Synoechnema anseriforme n.sp. and *S. hirsutum* n.sp. are described and figured. Three unusual features are recorded for the genus, viz., the swollen posterior of the female of *S. anseriforme*, the presence of numerous somatic setae on *S. hirsutum*, and the presence in both species of large paired subventral gland cells, each with three large nuclei, and with an accessory excretory pore posterior to the vulva. *S. anseriforme* is characterized by the greatly swollen posterior region of the mature female. *S. hirsutum* closely resembles *S. drawidae* but has somatic setae and ciliated egg shells. The type host for both the new species is the earthworm *Pheretima posthuma* collected from Subida, Dacca, East Pakistan. R. T. Timm

- 2012**—TRAVASSOS, L. & KLOSS, G. R., 1959. "Sobre a família Rhigonematidae (Artigas, 1930)." **Atas da Sociedade de Biologia do Rio de Janeiro**, 3 (5), 9–10.

Travassos & Kloss sought and now publish characters which can be used to separate *Rhigonema* and *Dudekemia* without reference to the female reproductive system. This work has led them to establish the new genus, *Ruizia*, now described with *R. longecausta* n.comb. as type, which includes those species formerly in *Dudekemia* which have small umbelliform thickenings of the cuticle around the lips. M. McKenzie

- 2013**—WHITEHEAD, A. G., 1959. [East African Agriculture and Forestry Research Organisation, Kenya.] "*Hoplolaimus aberrans* n.sp. (Hoplolaiminae: Tylenchida)." **Nematologica**, 4 (4), 268–271. [French summary pp. 270–271.]

Hoplolaimus aberrans n.sp. is described and figured from a single female. No outlets from the oesophageal glands were seen. The head is without tiling on its eight annules. The phasmids (scutella) are large, opposite and adanal, hence the uniqueness of this species in *Hoplolaimus*. It occurred on tobacco roots in Tanganyika. J. B. Goodey

- 2014**—WHITEHEAD, A. G., 1959. [East African Agricultural and Forestry Research Organisation, Kenya.] "*Trichotylenchus falciformis* n.g., n.sp., (Belonolaiminae n.subfam.: Tylenchida Thorne, 1949) an associate of grass roots (*Hyparrhenia* sp.) in Southern Tanganyika." **Nematologica**, 4 (4), 279–285. [French summary p. 284.]

Trichotylenchus falciformis n.g., n.sp. is described, figured and put into the new subfamily Belonolaiminae. The spear base is split slightly, each arm bearing a rounded, basal knob. The head is cap-like with four lips, each with about four annules. The tail in both sexes is about six anal-body-widths long with the phasmids behind the mid-point of the tail. The lateral fields have three incisures. The posterior part of the oesophagus overlaps the intestine as a glandular lobe. The ovaries are paired, outstretched and opposed; spermathecae are present; the vulva is median. The nematode occurred around roots of the grass *Hyparrhenia* sp. in Tanganyika. *Belonolaimus* is designated type genus of Belonolaiminae which is defined. J. B. Goodey

- 2015**—YAMASHITA, J. & KONNO, S., 1957. [Department of Parasitology, Faculty of Veterinary Medicine, Hokkaido University, Sapporo, Japan.] "On *Enterobius vermicularis microbulbus* subsp.nov. from a chimpanzee." **Japanese Journal of Veterinary Research**, 5 (3), 83–85.

Yamashita & Konno describe a new subspecies, *Enterobius vermicularis microbulbus*, from a female chimpanzee of African birth in the Maruyama Zoological Garden of Sapporo City, Japan. The new subspecies differs from the typical *E. vermicularis* from man, according to the authors, in having a smaller posterior oesophageal bulb. W. G. Inglis

Nematomorpha

No relevant abstracts in this issue

Hirudinea

See No. 2076.

Pentastomida

No relevant abstracts in this issue

Miscellaneous

No relevant abstracts in this issue

INVERTEBRATE INTERMEDIATE HOSTS

Arthropoda

See also Nos.: 1651, 1672, 1699, 1778, 1779, 1846, 1968, 2100, 2119, 2121, 2129, 2134, 2136, 2142, 2143, 2146, 2147, 2212.

2016—ANANTARAMAN, S., 1959. [Zoology Department, Madras University, India.] "Une larve de cestode dans le système nerveux de *Squilla holochista* Wood-Mason." *Annales de Parasitologie Humaine et Comparée*, **34** (5/6), 593-594.

Anantaraman records numbers of cestode larvae from the ganglia of the ventral nerve cord and interganglionic spaces of *Squilla holochista*, off the coast of Madras, India. They are referable perhaps to *Polypocephalus* Braun, 1878 (Order: Lecanicephala), adults of which are found in rays in the same area. E. I. Sillman

2017—DEGIUSTI, D. L. & BUDD, J., 1959. "A three-year survey of the infection rate of *Echinorhynchus coregoni* and *Cyathocephalus truncatus* in their intermediate host *Pontoporeia affinis* from South Bay Mouth, Ontario." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 25.

Over a period of three years (1956-58) 8,115 specimens of *Pontoporeia affinis* were examined for infection by *Echinorhynchus coregoni* and *Cyathocephalus truncatus*. The over-all infection rate of both parasites dropped from 7% to 4% and finally to 1.5%, on a yearly basis. Only eight of the amphidipods were found infected with both parasites which occurred singly in about the same ratio. N. A. Hancock

2018—FUJISAKI, T., 1959. [Department of Medical Zoology, Research Institute of Endemics, Nagasaki University, Nagasaki, Japan.] [Supplements to the finding on the susceptibility of Japanese mosquitoes to *Wuchereria bancrofti*. 2. On the susceptibility of *Anopheles hyrcanus sinensis* and *Culex tritaeniorhynchus*.] *Endemic Diseases Bulletin of Nagasaki University*, **1** (3), 278-287. [In Japanese: English summary pp. 286-287.]

Within the body of *Anopheles hyrcanus sinensis*, larvae of *Wuchereria bancrofti* were mostly killed in 1b stage or in an earlier substage of the first stage. The fact that filaria larvae could not reach maturity in this mosquito in Kyushu suggested that the mosquito was not important in the transmission of filariasis, at least in Kyushu. Within the body of *Culex tritaeniorhynchus* many filaria larvae could reach 1d substage or a stage just before the first ecdysis, when many of them were killed although some could reach the second stage. A few of them reached maturity. This species of mosquito was proved to have a low susceptibility but was rather zoophilous in feeding habits. Consequently, it appeared that the mosquito was of little importance in the transmission of filariasis in Japan. Y. Yamao

2019—HIDALGO ESCALANTE, E., 1959. "Simúlidos del Estado de Morelos (Dipt. Simuliidae)." *Acta Zoologica Mexicana*, **3** (1/2), 1-63.

With the object of studying the distribution of simuliids in the State of Morelos as well as ecological factors influencing it, faunistic material, principally larvae and pupae, were collected and studied all over the State. Some 23 species belonging to the genera *Gigantodax* and *Simulium* were encountered, of which only four are anthropophilous, namely, *Simulium* (*Psilopelmia*) *callidum*, *S. (P.) haematopotum*, *S. (Simulium) metallicum* and *S. (Notolepria) gonzalezi*. The paper is supplemented with maps and diagrams. N. Jones

- 2020—MATHUR, R. N., 1959. [Forest Research Institute, Dehra Dun, India.] "*Mermis* sp. (Mermithidae, Ascaroidea, Nematoda) and its insect hosts." [Correspondence.] **Current Science, Bangalore**, 28 (6), 255-256.

Hosts of an immature *Mermis* sp., probably *indica*, at Dehra Dun, India include one epilemid, an eucosmid, a hyblaeid, a notodontid, a pierid, a psychid, a sphingid, a chrysomelid, an acridid, two geometrids, three noctuids, and eight pyralids. Host food plants and time and place of parasitism are also given. H. E. Welch

- 2021—PISTEY, W. R., 1959. [Department of Zoology and Entomology, University of Connecticut, Storrs, Connecticut, U.S.A.] "Studies on the mortality of mosquitoes infected with *Dirofilaria tenuis* Chandler 1942." **Experimental Parasitology, New York**, 8 (6), 596-608.

Pistey has studied the periodicity of *Dirofilaria tenuis* through the mortality rate of the mosquitoes *Aedes taeniorhynchus* and *A. quadrimaculatus*. *D. tenuis* is nocturnal in periodicity with the maximum number of microfilariae in the peripheral blood around midnight. Mosquitoes fed on lightly or heavily infected raccoons (19 or 1,000+ microfilariae in 20 cu. mm. of blood) reached a peak mortality on the third or second day respectively, and this corresponded to the entry of pre-larvae into the Malpighian tubules. The subsequent daily mortality rates were higher in the mosquitoes with the highly infected blood meal. A second lesser peak, corresponding to the penetration of the ventriculus by the larvae occurred on the eighth to ninth day. 44.8% to 51.1% of mosquitoes survived until the larvae were infective after feeding on the lightly infected raccoon but only 15.1% after feeding on the heavily infected raccoon. It is thus concluded that mosquitoes which have become infected during a period of low microfilarial density in the blood are the more likely transmitters of infection. The high fatal effect of this nematode on the intermediate host suggests the possibility of biological control of the mosquitoes. G. I. Pozniak

- 2022—SELIVANOVA-YARTSEVA, A. S., 1959. [The epizootiology of *Drepanidotaenia* infections of geese in the Omsk region.] **Sbornik Nauchnikh Rabot Sibirskogo Nauchno-Issledovatel'skogo Veterinarnogo Instituta**, 8, 193-196. [In Russian.]

Infection of five species of *Cyclops* with *Drepanidotaenia lanceolata* in the northern Omsk region varied from 0.59 to 3.46% in five lakes and one river. The five species of *Cyclops* were *C. strenuus*, *C. viridis*, *C. prasinus*, *C. affinis* and *C. albidus*. Mass infection of birds occurred in May-June and increased in July-August. Experimental infections was successful in 114 of 117 cyclops; the intensity was high and cyclops with 15 or more larvae died. The cercocysts developed to the infective stage in 25 to 30 days and remained viable for seven to ten days. Five geese and five ducks were fed infected cyclops and 22 to 25 days later, four geese and two ducks passed proglottides. G. I. Pozniak

- 2023—WHARTON, R. H., 1959. [Institute of Medical Research, Kuala Lumpur, Federation of Malaya.] "Age determination in *Mansonioides* mosquitoes." [Correspondence.] **Nature, London**, 184 (4689), 830-831.

Wharton attempted to establish the actual age of *Mansonioides longipalpis*, *M. annulata* and *M. uniformis*, proved vectors of filariasis in different parts of Malaya, by the corpora lutea counting technique. This was found impossible as a large proportion of *M. longipalpis* carrying infective stage filarial larvae had laid only one batch of eggs. A large proportion of *M. longipalpis* and *M. uniformis* were found to be nulliparous. The technique suggested by Gillet, based on the fact that young mosquitoes are more often infested with parasitic larval hydrachnid mites than old ones, was found to be reliable qualitative character of age determination. This was concluded from the fact that practically all infested mosquitoes caught were nulliparous and also from an experiment in which 32 mite-infested mosquitoes were confined over a *Pistia* plant. Very few mites remained attached to mosquitoes after egg-laying. Another qualitative character noticed first by Crosskey and based on the condition of the Malpighian tubes is also mentioned. N. Jones

2024—WHARTON, R. H., 1960. [Institute for Medical Research, Kuala Lumpur, Federation of Malaya.] "Studies on filariasis in Malaya: field and laboratory investigations of the vectors of a rural strain of *Wuchereria bancrofti*." **Annals of Tropical Medicine and Parasitology**, **54** (1), 78–91.

Wharton presents evidence, from field and laboratory studies, that, whereas *Culex pipiens fatigans* is the vector of *Wuchereria bancrofti* in Singapore, a mosquito closely related to *Anopheles letifer* transmits the worm among Malays living in rural areas 40 to 50 miles from the mouth of the Pahang river. A comparison is made between the development of the rural and urban (Singapore) strains of *W. bancrofti* in *C. p. fatigans* and it is shown that, in laboratory conditions, the mosquito is 20 times more efficient as the host for the urban strain than for the rural strain. Some observations on the development of the urban strain of *W. bancrofti* in *C. p. fatigans* are recorded and the paper concludes with a discussion on the distribution and dispersal of *W. bancrofti* through Asia and the Pacific.

P. Williams

Mollusca

See also Nos.: 1592, 1594, 1602, 1767, 1810, 1815, 1838, 1967, 1972, 1973, 2115, 2116, 2117, 2121, 2131, 2133, 2134, 2135, 2137, 2141, 2142, 2143, 2149, 2206, 2325.

2025—BEADLE, L. C., 1960. [Makerere University College, Uganda.] "The swamps of Uganda." **Span. London**, **3** (1), 14–17.

Biomphalaria sudanica, which is a vector not only of *Schistosoma mansoni* but also of *Fasciola gigantica* and *Paramphistomum* spp., is very common throughout the papyrus swamps of Uganda. Control by molluscicides holds out little hope of success and research aimed at the discovery of other and more effective methods is being expanded.

J. M. Watson

2026—CORT, W. W., HUSSEY, K. L. & AMEEL, D. J., 1960. "Seasonal fluctuations in larval trematode infections in *Stagnicola emarginata angulata* from Phragmites Flats on Douglas Lake." **Proceedings of the Helminthological Society of Washington**, **27** (1), 11–13.

Cort *et al.* noted a reduction in number and variety of trematode infections in *Stagnicola emarginata angulata* in 1957 as compared with those *Stagnicola* examined in 1936, and suggest that the decrease may be due to the diminishing numbers of water birds visiting the beaches because of the increased numbers of summer cottages around the lake.

E. I. Sillman

2027—FRAGA DE AZEVEDO, J. & MEDEIROS, L. DO C. M. DE, 1959. [Instituto de Medicina Tropical, Lisbon, Portugal.] "Bases pour la classification des gastéropodes pulmonés d'eau douce. Sur la nécessité d'uniformiser les méthodes de classification." **Acta Tropica. Basle**, **16** (1), 38–62. [English & German summaries p. 62.]

Fraga de Azevedo & Medeiros point out that the present basis of classification of the snail intermediate hosts of schistosomiasis is unsatisfactory because of the vague nature of the characters used. They suggest that more attention should be given to biological characters such as susceptibility to infection with *Schistosoma* spp., chromosome numbers, cross-fertilization experiments and biochemical analyses of secretions. The paper includes an example of a key for the identification of snails in the Sul do Save province of Mozambique.

C. A. Wright

2028—KOMIYA, Y. & KOJIMA, K., 1959. [Department of Parasitology, National Institute of Health, Tokyo.] "The production of F_2 offspring from F_1 (hybrids) of *Oncomelania nosophora* and *O. hupensis*." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 23–24.

Komiya & Kojima report that F_1 offspring obtained by crossing *Oncomelania nosophora* from Japan with *O. hupensis* from China have successfully produced an F_2 generation, thus reinforcing the point that these are not biologically distinct species.

C. A. Wright

Control

See also Nos.: 1690, 2025.

- 2029—IKESHOJI, T., SASA, M. & OSADA, Y., 1959. [Department of Parasitology, Institute for Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Observations on the effects of anti-mosquito measures in the control of filariasis in 1958.] *Japanese Journal of Sanitary Zoology*, 10 (3), 188–196. [In Japanese: English summary p. 196.]

The larvae of the four species of mosquitoes *Culex pipiens pallens*, *Aedes aegypti*, *A. albopictus* and *Armigeres subalbatus* were used for a screening test of various insecticide emulsions for their effectiveness. Parathion had the strongest effect on the insects, followed by dieldrin; various other organic phosphates were less effective. The residual effect of each insecticide was tested on the mosquito larvae by using each insecticide in solution at its LC₅₀ concentration: the chlorinated insecticides such as p-p'-D.D.T., lindane and dieldrin were effective two days after the application as well as at the time of application, whereas the organic phosphorus insecticides, diazinon and malathion, lost their effectiveness entirely two days later. In Ehime Prefecture, residual dieldrin spray was applied, and the mosquitoes were successfully eradicated all through the summer. On the other hand, house-flies were only controlled for about one month and later the population showed an abnormal increase. Similar phenomena were observed in Amami Island. The authors stated that it was necessary to improve the methods of application of insecticides and suggested an alternate use of the chemicals.

Y. Yamao

- 2030—MEYLING, A. H., MEYLING, J., SCHUTTE, C. H. J. & PITCHFORD, R. J., 1959. [South African Council for Scientific and Industrial Research, Bilharzia Field Unit, Nelspruit, Transvaal, S.A.] "Some observations on the effectiveness and stability of sodium pentachlorophenate when used as a molluscicide." *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 53 (6), 475–481.

Meyling *et al.* have carried out trials of sodium pentachlorophenate as a molluscicide in South Africa. Because of the irritant properties of this compound when used as a spray it is normally applied either in briquettes or by a drip system but neither of these methods gives very satisfactory mixing with water. The rapid break-down of snail-killing properties brought about by alkalinity and sunlight render pentachlorophenate unsuitable for use in the Transvaal where the majority of the important snail habitats are shallow pools which are exposed to bright sunlight.

C. A. Wright

- 2031—OLIVIER, L. & HASKINS, W. T., 1959. [U.S. Department of Health, Education, and Welfare, Public Health Service, Bethesda, Maryland, U.S.A.] "The influence of very low concentrations of sodium pentachlorophenate upon the fecundity and egg viability of *Australorbis glabratus*." [Abstract.] *Journal of Parasitology*, 45 (4, Sect. 2), 17.

[The full account of this work appears in *Amer. J. trop. Med. Hyg.*, 9, 199–205. For abstract see No. 2032 below.]

- 2032—OLIVIER, L. & HASKINS, W. T., 1960. [National Institute of Allergy and Infectious Diseases, Bethesda, Maryland, U.S.A.] "The effects of low concentrations of sodium pentachlorophenate on the fecundity and egg viability of *Australorbis glabratus*." *American Journal of Tropical Medicine and Hygiene*, 9 (2), 199–205.

Tests of the effect of sodium pentachlorophenate in concentrations of 0.05 and 0.1 p.p.m. on egg-laying and the viability of the eggs of *Australorbis glabratus* were performed in the laboratory. The tests lasted for seven to eight days after which the water was changed and replaced with untreated water to show possible recovery of egg production and viability. Withdrawal of the chemical was followed by greater egg-laying activity and increased viability. The lower concentration was found to be rather too low, the effect of 0.1 p.p.m. being very much better.

W. K. Dunscombe

- 2033—TÖLGYESI, G., 1958. [Innere Klinik, Veterinärmedizinische Hochschule, Budapest, Hungary.] "Über das Verhalten von Kupfersulfat bei der Schneckenilgung im Gelände." *Acta Veterinaria*, Budapest, 8 (1), 17–30.

In order to obtain a more efficient control of snails with copper sulphate, Tölgyesi has studied the sedimentation and dissolution of copper salt precipitates in streams, the effect of acidification on solution of these precipitates, the temporary and local changes in copper sulphate concentrations, adsorption by plants and the stream bottom, and the speed of dissolution of metallic copper. A high concentration of copper sulphate evenly distributed and lasting is

difficult to achieve when the copper sulphate is applied at the source of the stream. An application of 1 kg. per 50 litres per minute gave a temporary high concentration (of up to 1:500 dilution) in the upper section of the stream and dilutions of 1:500,000, which were maintained for days under favourable conditions, in the remaining sections. The edges and meanders of the stream must, in addition, be sprayed with 5% copper sulphate. In still waters it is necessary to work with initial concentrations of over 1:100,000. High concentrations, however, are unsuitable because of their high specific gravity. Tölgyesi found that a 5% copper sulphate solution with added 10% hydrochloric acid to reduce the degree of sedimentation and adsorption was suitable and gave more economic results.

G. I. Pozniak

2034—VASILEVA, I. N., 1960. [Ammonium nitrate for the control of *Galba truncatula* on pasture.] *Veterinariya*, **37** (2), 41–43. [In Russian.]

Vasileva found that out of ammonium sulphate, potassium chloride, commercial calcium superphosphate, ammonium nitrate and sodium nitrate, only ammonium nitrate had an appreciable effect against *Galba truncatula* as tested under laboratory conditions. 100% molluscidal effect was obtained within 24 to 48 hours with 0.1% concentration. 0.2% concentration killed the snails within 12 hours and had 84% efficacy within 24 hours in field experiments. The efficacy was, however, 73% when the chemical was applied on swampy ground and under these conditions 0.4% concentration was necessary to produce a 94% efficacy within six hours. Examination of 964 specimens of *Galba truncatula*, *G. palustris*, *Radix ovata* and *Planorbis planorbis* revealed that only *G. truncatula* were infected with *Fasciola* larvae. Only five out of 25 lambs which grazed on a pasture one week after it had been treated with ammonium nitrate contracted fascioliasis as compared with 24 in the control group.

N. Jones

Miscellaneous

See Nos.: 1858, 2136.

GENERAL HELMINTHOLOGY

Technique

See also Nos.: 1617, 1624, 1662, 1663, 1673, 1692, 1726, 1754, 1769, 1770, 1788, 1792, 1895, 1896, 1925, 1928, 1932, 1935, 1936, 1946, 1956, 2023, 2061, 2127, 2143, 2166, 2185, 2211, 2248.

2035—ACHARYA, P. T., AMIN, S. P. & SAYED, B. A., 1959. [Department of Pathology, Medical College, Baroda.] "Comparative evaluation of concentration methods for the detection of cysts and ova in faeces." *Journal of the Indian Medical Association*, **32** (8), 322–324.

Acharya *et al.* examined 400 freshly passed faecal samples by direct wet preparation, De Rivas' acid ether concentration, zinc sulphate centrifugal flotation and brine flotation. The efficiencies of these four methods were compared by expressing the number of positives detected by each method as a percentage of the total number of positives recorded by all four methods. The figures for helminth eggs were 31.0%, 47.0%, 82.0% and 92.0% respectively. It was concluded that brine flotation was superior to the other methods for concentration of helminth eggs. It is suggested that a combination of the wet preparation and brine flotation gives better results than either method alone.

J. E. D. Keeling

2036—ALICNA, A. D. & FADELL, E. J., 1959. [Ireland Army Hospital, Fort Knox, Kentucky, U.S.A.] "Advantage of purgation in recovery of intestinal parasites or their eggs." *American Journal of Clinical Pathology*, **31** (2), 139–141.

In examining stools for mixed helminths and protozoal infections Alicna & Fadell found that three samples from stools following a saline purge gave better results than samples from normal stools. The samples were sieved and sedimented twice in saline before being subjected to zinc sulphate flotation, acid-ether centrifugation, formalin-ether sedimentation and direct

smear examination. Acid-ether centrifugation yielded best results with helminth eggs and larvae. The combination of two of these methods is recommended for routine use. The Scotch tape method was found to yield best results in the diagnosis of *Enterobius vermicularis* infection.

J. E. D. Keeling

- 2037**—BASNUEVO, J. G., 1959. [Hospital Universitario General Calixto García, La Habana, Cuba.] "Solución F2AM para el diagnóstico de protozoarios y helmintos." **Revista Kuba de Medicina Tropical y Parasitología**, 15 (1/6), 22-23.

The F2AM solution described is a methylene blue, alcohol, phenol, formol mixture made up as a stock solution which is diluted for general use. Both stock and dilute solutions will keep for five years and faecal specimens placed in the latter will show parasites and ova for two years. For concentration procedures a third solution is used in which the formol content is reduced.

W. K. Dunscombe

- 2038**—CARBALLEIRA, D. ET AL., 1959. "Una aportación al diagnóstico coprológico de la distomatosis hepática." **International Veterinary Congress (16th)**, Madrid, May 21-27, 1959. Vol. II, pp. 591-596.

Carballeira *et al.* describe a technique for faecal diagnosis of *Fasciola hepatica* infection in bovines which consists principally in: (i) dilution and homogenization of 200 gm. of faeces with half the quantity of water; (ii) straining through a metallic sieve with 10 meshes per cm.; (iii) sedimentation of a total volume of 1,000 c.c. for 15 minutes and elimination by siphoning off 700 c.c. of the upper layers; (iv) passing the remaining 300 c.c. through a gauze with 20 meshes per cm.; (v) second dilution and sedimentation for 10 minutes, followed by siphoning off 800 c.c. of the upper layers; (vi) two further sedimentations of five minutes each. Finally the sediment is examined in a petri dish or by projection trichinoscopy, in a special trough with the same surface as the plates of the trichinoscope. 300 diagnoses were made by this method and the efficacy of the technique was found to be 99.2%, whereas other methods in the same cases produced errors of the order of 26.3% to 47.3%. The paper is illustrated with numerous photographs.

N. Jones

- 2039**—CARNERI, I. DE, 1957. [Istituto d'Igiene e Microbiologia dell'Università di Pavia, Italy.] "Mantenimento di un alto livello di infestazione da *Syphacia obvelata*; *Aspiculuris tetraptera* e *Hymenolepis nana* var. *fraterna* in una colonia di topi utilizzati per prove antelmintiche." **Archivio Italiano di Scienze Mediche Tropicali e di Parassitologia**, 38 (12), 641-654. [English, French & German summaries pp. 650-651.]

Carneri, after discussing the work of others on the use of *Syphacia obvelata*, *Aspiculuris tetraptera* and *Hymenolepis nana* var. *fraterna* infections for testing anthelmintics, reports on his own experiments. Simultaneous infections with all three parasites were obtained by keeping six to ten adult naturally infected mice with about 100 young mice. In different lots the adult animals harboured one or all three parasites at the same time. A high level of infection was thus obtained.

N. Jones

- 2040**—CAVIER, R. & DEBELMAS, A. M., 1959. "La culture in vitro de *Rhabditis macrocerca* Kreis et Faust, 1933." **Bulletin Biologique de la France et de la Belgique**, 93 (1), 73-77.

20 non-sterile media were tested for the culture of *Rhabditis macrocerca*, most of them made up in 1.5% agar. The best medium contained, per litre, 3 gm. Liebig's meat extract, 5 gm. bacteriologic peptone, 5 gm. sodium chloride and 10 gm. glucose. Attempts to obtain sterile cultures were unsuccessful. Nematodes treated with streptomycin, framycetin, neomycin or dihydro-streptomycin with penicillin failed to develop on a sterile medium. Antibiotics added to the medium, or sterilization of active cultures also failed.

M. T. Franklin

- 2041**—CLEGG, J. A., 1959. [Department of Parasitology, The Hebrew University of Jerusalem, Israel.] "Development of sperm by *Schistosoma mansoni* cultured in vitro." **Bulletin of the Research Council of Israel. Section E, Experimental Medicine**, 8 (1/2), 1-6.

Clegg removed seven-day-old *Schistosoma mansoni* larvae from the lungs of mice and introduced them into a medium consisting of 50% inactivated rabbit serum, 50% Hank's saline, 1-2% homologous rabbit red blood cells, 100 units per ml. penicillin, 100γ per ml. streptomycin

and 0.005% phenol red. The cultures were opened at weekly intervals and the larvae compared with the appropriate stage of optimum development in the mouse. The stages in the mouse were as follows: (o) cercariae; (i) lung larvae seven days; (ii) gut development 15 days; (iii) organogeny 21 days; (iv) gametogeny 28 days; (v) appearance of egg-shell protein 30 days; (vi) oviposition 35 days. In the basic medium the seven-day-old larvae did not reach stage (ii) in eight days but did so if the medium was enriched with amino-acids in the form of 0.25% lactalbumin hydrolysate. When the medium was changed every four days instead of weekly, development to stage (iv) was reached one week later than *in vivo*. Only a small percentage of males produced sperm and after continued culture no further development occurred and the testes actually degenerated in many cases. Some females developed a small ovary after four weeks *in vitro* and in the subsequent month all females reached stage (iv) but there was no further development which was thought to be due to the fact that copulation had not occurred.

D. L. H. Robinson

2042—DITTMANN, A., 1959. "Ein einfaches Verfahren zum Anreichern und Untersuchen von Nematodenzysten aus grösseren Bodenmengen." **Nachrichtenblatt des Deutschen Pflanzenschutzdienstes**, Stuttgart, 11 (2), 24-26. [English summary pp. 25-26.]

By means of two funnels and a three-way tap, Dittman reduces the proportion of unwanted matter to *Heterodera* cysts in the material floated from infested soil in a Fenwick can. He states that 90% of debris can be eliminated without loss of cysts. The material is dried on cheesecloth, sieved through a 1 mm. sieve and examined under a binocular microscope with transmitted light which enables empty cysts to be distinguished from full.

M. T. Franklin

2043—DUCE, A. & CARTA, G., 1957. [Consorzio Provinciale Antitubercolare di Bologna, Italy.] "La schermografia nel 'dépistage' della echinococcosi epatica." **Bollettino Schermografico**, Rome, 10 (5/6), 141-146. [English & French summaries p. 146.]

Duce & Carta point out the possibility of diagnosing hepatic hydatidosis by photofluorography. This technique is very important in Sardinia, where the incidence of hydatid disease is very high. The authors discuss interpretation of photofluorograms and include some reproductions of these.

N. Jones

2044—GINSBERG, A., 1960. [Department of Veterinary Services, Kenya.] "The detection of cysticercosis bovis in the abattoir." **Veterinary Record**, 72 (16), 310.

Since 1955 the following measures have been adopted at abattoirs in Kenya for the detection of *Cysticercus bovis*. Visual examination is made of the tongue and the incised ventral aspect of the roof, and of the oesophagus and all muscles exposed during splitting of the carcass. The external and internal muscles of mastication are extensively incised. Three incisions are made into the muscles of the shoulder close to the elbow joint, and the abductor [?adductor] muscle of the hindquarter is incised parallel to the symphysis pelvis. Incisions are made into the heart only when considered necessary. Examination includes calves under six weeks old, as cysts have been found in newly born animals. The effectiveness of this inspection is denoted by the fact that in 400,000 animals recently examined, only four cases were reported. By thorough inspection of carcasses, propaganda, health education, and mass treatment campaigns, Kenya has reduced the incidence of cysticerciasis during the last three years by 7%.

F. H. S. Roberts

2045—HAHN, A. W., 1960. [Department of Small Animal Surgery and Medicine, School of Veterinary Medicine, Auburn, Ala., U.S.A.] "Angiocardiography in canine dirofilariasis. II. Utilization of a rapid film change technique." **Journal of the American Veterinary Medical Association**, 136 (8), 355-358.

Fourteen dogs infected with *Dirofilaria immitis* were subjected to intravenous angiocardiography before and after surgical removal of the worms via pulmonary arteriotomy. A rapid film-changing device was utilized to follow the contrast medium through the heart and lungs. Streaking, mottling or reticulation of the contrast medium was evident in the pulmonary arteries of infected dogs in the pre-operative angiocardiograms but was not seen in the post-operative angiocardiograms. Dilatation of one or both pulmonary arteries was also evident and this persisted after surgery. It is suggested that this technique may be of use in selecting dogs for pulmonary arteriotomy removal of heartworms.

K. R. Heath

- 2046—HARPER, K., LITTLE, M. D. & DAMON, S. R., 1957. [Bureau of Laboratories, Indiana State Board of Health, Indianapolis, U.S.A.] "Advantages of the PVA-fixative two-bottle stool collection technic in the detection and identification of intestinal parasites." **Public Health Laboratory, Burlington, Vt.**, 15 (4), 96-108.

Unpreserved stools were examined by zinc sulphate concentration and wet mount techniques. Zinc sulphate concentration was the more satisfactory technique for the detection of helminth infections. Material preserved in P.V.A. fixative was examined for protozoal infections only.

J. E. D. Keeling

- 2047—KLOTZ, L. J., DEWOLFE, T. A. & BAINES, R. C., 1959. [University of California Citrus Experiment Station, Riverside, California, U.S.A.] "Laboratory method for testing effectiveness of soil disinfestants." **Plant Disease Reporter**, 43 (11), 1174-1175.

Klotz *et al.* describe the use of lucite cylinders which are filled with soil in which citrus seedlings infected with *Phytophthora parasitica* are allowed to grow, the aerial parts protruding from slots in the cylinder at various levels. After a time interval, to allow suitable infection of the roots, the seedlings are cut off outside the cylinder and the slots sealed. The test chemical is then introduced into the top one inch of soil and its progress down the column in terms of activity measured. The authors add that the method might be useful for nematodes.

J. E. Peachey

- 2048—LEWIS, D. G., 1960. "Extraction of *Ditylenchus dipsaci* from organic soil and dried onion scales." [Abstract of paper presented at the 19th Annual Meeting of the Northeastern Division, American Phytopathological Society, West Springfield, Mass., November 5-6, 1959.] **Phytopathology**, 50 (4), 240.

- 2049—LOWNSBERY, B. F., MITCHELL, J. T. & HEAD, E. E., 1959. [Department of Plant Nematology and Agricultural Engineering, University of California, Davis, California.] "An electric auger for nematological soil sampling in orchards." **Plant Disease Reporter**, 43 (8), 918-919.

For sampling orchards, where plant nematodes may occur at depths of several feet, Lownsbbery *et al.* have constructed a special tool. A one-inch diameter masonry type drill point is welded to a "ship auger" three feet long and three-quarters of an inch in diameter. The wider point gives clearance for easy withdrawal of the auger from the soil. The auger is driven by a hand electric drill with reducing gear, connected to a 1,500-watt generator or, for intermittent use, to a car battery. Tests on artificially inoculated soil showed that samples taken with the auger accurately represented the 0-3 ft. depth profile.

R. D. Winslow

- 2050—MALO, S., 1960. [Department of Fruit and Crops, Citrus Experiment Station, University of Florida, Gainesville, Florida, U.S.A.] "Comparative efficiencies of three methods for extracting nematodes from root and soil samples." **Plant Disease Reporter**, 44 (3), 217-219.

Malo compared three methods of extracting nematodes from soil and roots: (i) the Christie & Perry method, (ii) the Seinhorst elutriator and (iii) an improved Tarjan, Simanton & Russell modification of the Oostenbrink elutriator [for abstracts see Helm. Abs., 20, No. 265d; 25, Nos. 266i & 272j; 23, No. 448c respectively]. Method (i) was the fastest (eight minutes per sample), (ii) the cleanest but most time consuming (30 minutes) and (iii) the most efficient, recovering nearly twice as many nematodes as either of the others and requiring 12 minutes per sample. The test soil was a sandy loam with 2% organic matter and a nematode fauna mainly of free-living forms with few plant parasites.

R. D. Winslow

- 2051—MARZULLO, F., SQUADRINI, F. & TAPARELLI, F., 1957. [Clinica delle Malattie Infettive e Tropicali, Università di Modena, Italy.] "Il test di Thorn nelle eosinofilie parassitarie." **Bollettino della Società Medico-Chirurgica di Modena**, 57 (1), 1-12.

20 parasitized persons with eosinophilia of over 10% were given ACTH (Thorn's test). The test gave positive results in 55% of the cases. The authors make numerous deductions from this experiment.

N. Jones

- 2052**—MAZZOTTI, L., GONZÁLEZ BARRANCO, D. & HIRANAKA, H., 1957. [Instituto de Salubridad y Enfermedades Tropicales, Mexico.] "Aplicación de la balanza rápida de precisión, en la cuenta de huevos de helmintos." *Revista del Instituto de Salubridad y Enfermedades Tropicales, Mexico*, **17** (3), 127–128. [English summary p. 128.]

An egg counting technique, using the mechanical weight carrier analytical balance is described. It consists of weighing a slide alone, then with a small quantity of faeces, diluting the faeces with physiological saline on the slide, counting the eggs and working out their number per gramme of faeces by the rule of three. This method can be applied in the case of soft or liquid faeces. In the case of very hard faeces, these are diluted with an equal volume of water before the operation.

N. Jones

- 2053**—OISHI, I. & KUME, S., 1959. [School of Veterinary Medicine, Tokyo University of Agriculture and Technology, Fuchu, Tokyo, Japan.] [Studies on the diagnosis of canine filariasis. II. Experiments on microfilariae-driving effects of chemicals other than piperazine preparations.] *Journal of the Japan Veterinary Medical Association*, **12** (1), 12–15. [In Japanese: English summary p. 15.]

Fourteen compounds were tested for their effect in driving nine microfilariae into the bloodstream. Four compounds, i.e., pilocarpine hydrochloride, daviol or pyrocatechin sodium disulphonate, filarsen or hydrochloride of dichlorophenarsin, and communin or filtrate of culture media of *Escherichia coli communior*, were found to be effective. But supatonin or citrate of 1-diethylcarbamy-4-methyl piperazine, which has previously been reported by the authors, is recommended for clinical use.

Y. Yamao

- 2054**—ROTHSTEIN, N., BROWN, M. L. & CARITHERS, R. W., 1959. "Vital staining and differentiation of microfilariae." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 38.

Vital staining of microfilariae with acridine orange permits rapid scanning of whole blood preparations for viable microfilariae with the aid of dark ground illumination and glass colour filters. Differentiation of viable microfilariae of *Dirofilaria immitis*, *D. uniformis* and *Dipetalonema* sp. is possible with Coriphosphine O. Cytochemical differences between these microfilariae have thus been demonstrated for the first time. This technique permits study of mobility characteristics and reactions to external factors such as dyes, and aids the study of host-parasite relationships.

W. M. Fitzsimmons

- 2055**—SAYRE, R. M. & MOUNTAIN, W. B., 1959. "A bioassay method for determining soil populations of *Ditylenchus dipsaci*." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] *Phytopathology*, **49** (9), 549.

Sayre & Mountain describe the development of a method for determining the soil population of *Ditylenchus dipsaci* using onion seedlings as the test plants. By this method a population of ten *D. dipsaci* per lb. of soil could be detected. 70°F. was the optimum temperature for nematode reproduction, seedling mortality and bloat, and 80°F. for greatest seedling stunting.

D. J. Hooper

- 2056**—SCHILLER, E. L., 1959. "A procedure for comparative studies of mutagenesis in cestodes." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 29.

The scolex and a small part of the "neck" of *Hymenolepis diminuta* are removed from the strobila and treated (X-irradiation, chemical mutagens, etc.). They are then surgically implanted in the duodenum of a helminth-free rat, where development of a new strobila occurs and, after a time for development, the new strobila is removed on autopsy and prepared as a whole mount for comparison with the original strobila similarly mounted. The scolex and "neck" can be further transplanted and the procedure repeated until a series of strobilae for comparison is obtained. By allowing sufficient time for the treated individual to become gravid and using the eggs for further infections, morphological and biochemical observations may be compared over several generations to ascertain possible inheritance of the effects.

N. A. Hancock

- 2057—SCHILLER, E. L., READ, C. P. & ROTHMAN, A. H., 1959. "Preliminary experiments on the growth of a cyclophyllidean cestode *in vitro*." [Abstract.] **Journal of Parasitology**, 45 (4, Sect. 2), 29.

The scolex and small part of the "neck" of fresh *Hymenolepis diminuta* were severed from the strobila, washed in Ringer's solution and Gey's solution containing streptomycin and penicillin and put in a tube of test medium which was placed in a roller drum at 38°C. Various media were tested, the best growth occurring in 50% horse serum to which an extract of cestode tissue had been added. Five worms from 11-day cultures were surgically implanted in separate rats and at autopsy three of them had normal *H. diminuta*.
N. A. Hancock

- 2058—STECK, W. & STETTLER, H., 1959. [Veterinärmedizinische Klinik, Universität Bern, Switzerland.] "Zum Nachweis der Magentrichostrongylose des Pferdes." **Schweizer Archiv für Tierheilkunde**, 101 (7), 337-340. [English, French & Italian summaries p. 340.]

The clinical picture of *Trichostrongylus* infections in horses is briefly discussed and a simple method for the culture of larvae to aid differentiation from *Strongylus* is described. The eggs are obtained from the faeces by a flotation technique with unrefined sugar solution and are then placed in water in an incubator at 37°C. until they hatch after one or more days.

G. I. Pozniak

- 2059—SUGURO, T., 1959. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [Experimental study on the treatment of paragonimiasis. 1.] **Japanese Journal of Parasitology**, 8 (4), 518-522. [In Japanese: English summary p.522.]

In dogs experimentally infected with *Paragonimus westermani*, the faecal eggs per day, calculated as an average over five days, became generally constant certain days after the flukes began producing the eggs. Since the capacity of the flukes to produce the eggs was fairly well sustained, the number of parasites could be estimated by faecal egg numbers. When chemotherapy was commenced after the eggs per day became constant, the effectiveness of treatment could be judged from the changes in the daily egg count.

Y. Yamao

- 2060—TARJAN, A. C., 1960. [Florida Citrus Experiment Station, Lake Alfred, Florida, U.S.A.] "Induction of traps of nematophagous fungi using *Panagrellus redivivus*." [Correspondence.] **Nature**, London, 185 (4715), 779-780.

Panagrellus redivivus is shown to be a useful nematode for addition to agar cultures of nematophagous fungi to bring about trap formation. As adequate supply of these nematodes is easily maintained by means of the oatmeal culture method [as described by Cheo & Tarjan, 1955; for abstract see Helm. Abs., 24, No. 37e]. They are highly prolific and can be stored for years by refrigeration.

A. M. Shepherd

- 2061—TARJAN, A. C., 1960. [Florida Citrus Experiment Station, University of Florida, Lake Alfred, Florida U.S.A.] "Incubation of soil and root samples in polyethylene plastic for improved recovery of nematodes." **Plant Disease Reporter**, 44 (1), 31-35.

For the purpose of recovering the maximum number of *Radopholus similis* (Cobb) in soil and root samples of citrus trees, 250 c.c. of a mixture of half-inch long root excisions and soil taken from 3 ft. depth were placed in 1 mm. thick polyethylene bags and incubated. Assessment of nematode numbers from roots, and debris deposited on the screen of an elutriator, was made by the Baermann funnel technique. Similar numbers of nematodes were obtained from roots and soil surrounding them. The maximum number of nematodes was present after one week of incubation and of several temperature levels tested the most desirable was 75°F. Tarjan prefers this method to direct examination of samples by the Baermann funnel technique owing to the closer approximation of rhizosphere conditions in the polyethylene bags, allowing normal behaviour of nematodes.

H. Jacks

- 2062—TEUSCHER, E., 1957. [Veterinär-pathologisches Institut, Universität Zürich, Switzerland.] "Eine neue praktische Flotationsmethode für den koprologischen Nachweis der Leberegeleier." **Schweizer Archiv für Tierheilkunde**, 99 (9), 523-528. [English, French & Italian summaries pp. 527-528.]

Teuscher has devised a simple, practical and reliable flotation technique for the detection of liver-fluke eggs in sheep faeces. 2.5 gm. of faeces are agitated with 37.5 c.c. of water and

filtered through a 1 mm. mesh. The faecal suspension is then well mixed with an equal amount of flotation solution in a flask holding 75 c.c., and the top layer is examined for eggs at least one hour, but preferably six to eight hours, later. The most satisfactory flotation solution is 80 gm. zinc sulphate and 25 gm. sugar in 100 c.c. of water.

G. I. Pozniak

- 2063**—TEUSCHER, E. & SCHULER, G., 1959. [Veterinär-pathologisches Institut, Universität Zürich, Switzerland.] "Weitere Untersuchungen zur koprologischen Diagnose der Fascioloose bei Wiederkäuern." *Schweizer Archiv für Tierheilkunde*, **101** (7), 331–336. [English, French & Italian summaries p. 336.]

Teuscher & Schuler describe a comparatively simple technique for the detection of liver-fluke eggs in the faeces of ruminants, which concentrates the largest possible number of eggs in a small amount of liquid. 5 gm. of faeces are mixed with 120 c.c. of water (added gradually) and filtered into a conical glass through a 0.5 mm. mesh and again through a 0.28 mm. mesh. After sedimentation for five minutes, the supernatant is carefully removed and the 1.5 c.c. of bottom sediment is floated with 10–12 c.c. of a 44.4% zinc sulphate solution and centrifuged for four minutes at 1,000–2,000 r.p.m. Two 0.01 c.c. samples of the top layer are then examined. The method can be used for quantitative determinations. [A simple flotation method for sheep faeces was described by Teuscher in 1957; for abstract see No. 2062 above.]

G. I. Pozniak

- 2064**—TINER, J. D., 1959. "Toward effective use of laboratory cultures of *Pratylenchus*." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 57–58.

Tiner emphasizes the need for more work on laboratory culturing of plant nematodes. He then describes his own preliminary work towards culturing roots and nematodes in a constant chemical environment, hermetically sealed to exclude contaminants and confine volatile toxicants.

R. D. Winslow

- 2065**—TINER, J. D., 1960. [Department of Entomology, Rutgers, The State University, New Brunswick, New Jersey, U.S.A.] "Cultures of the plant parasitic nematode genus *Pratylenchus* on sterile excised roots. I. Their establishment and maintenance." *Experimental Parasitology*, **New York**, **9** (2), 121–126.

Tiner describes in detail his techniques for preparing axenic cultures of *Pratylenchus* and introducing them to sterile cultures of excised maize (*Zea mays*) roots. The latter were grown in a modified White's solution, with and without agar. Four lines of *P. penetrans* were successfully cultured, inocula for fresh root cultures being obtained by excising and transferring under aseptic conditions nematode lesions from older cultures. The techniques are compared with those of previous workers and possible future modifications are discussed, with the aim of evolving "a reliable method for preparing and handling standardized suspended inoculum" as a pre-requisite for "accurate chemical inhibition studies or work toward an artificial nutrient substrate".

R. D. Winslow

- 2066**—TRIOZON, F., 1957. [Laboratoire départemental de Chimie et Bactériologie de Macon, Saône-et-Loire, France.] "Diagnostic de la distomatose hépatique humaine par la recherche des oeufs dans les selles." *Annales de l'Institut Pasteur de Lille*, **9**, 105–112. [English summary p. 111.]

Triozon compared the concentration techniques of Telemann-Rivas, Carles-Barthélémy, Faust, Willis, Janecksó & Urbanek (Janecksó & Urbanek, 1931, *Allatorv. Lapok*, **54**, 247–248) and direct smear examination for finding *Fasciola hepatica* eggs in human faeces. The technique of Janecksó & Urbanek proved superior to the others judging by the numbers of eggs found. The optimum density of the iodomercurate of potassium solution employed as a flotation medium in the latter technique was found to be 1.440 in the case of *F. hepatica* eggs.

N. Jones

- 2067**—VIGLIERCHIO, D. R., 1959. [Department of Plant Nematology, University of California, Davis, California, U.S.A.] "Collection and selection of cysts of the sugar beet nematode, *Heterodera schachtii*." *Journal of the American Society of Sugar Beet Technologists*, **10** (4), 318–329.

Viglierchio describes recent methods for separating large numbers of viable *Heterodera* cysts from soil. Sieving, flotation, hydration, elutriation, rolling and the use of electrostatic fields

are described in general terms, and combinations of methods can lead to samples of very high purity. Hydration is used to obtain the fuller and more viable cysts. The float obtained by sieving followed by flotation is shaken with water in a conical flask and the sediment discarded. The new float is treated in a Waring blender for 20–30 seconds, again shaken with water, and left for six hours for organic debris to settle. Material settling between the 6th and 30th hours consists of full cysts. The remaining float consists of cysts of poor viability. The elimination of 90% of impurities is reported. Elutriation follows and is carried out in a vertical glass cylinder 100 cm. \times 4 cm., similar to that used by Hesling. This is followed by rolling. Dry samples of cysts can be winnowed by pouring through an electrostatic field between charged plates, and repetition leads to very clean samples. A full report is in preparation. Cysts for experimental work should be cultivated in sand, thus eliminating the problem of organic debris in subsequent extractions. Better cysts also result. E. Bennett

2068—WALKER, J. T. & WILSON, J. D., 1960. [Ohio Agricultural Experiment Station, Wooster, Ohio, U.S.A.] "The separation of nematodes from soil by a modified Baermann funnel technique." **Plant Disease Reporter**, **44** (2), 94–97.

A two-inch section of aluminium pipe of three inch diameter, fitted with a 2 mm. mesh aluminium sieve tightly held on the pipe by an aluminium ring, was placed in the flaring portion of a Baermann funnel. A double thickness of tissue paper was placed on the screen and a 15 c.c. sample of soil was poured on to it. Sufficient water was added to wet but not flood the soil. Counts were made 24 hours later. This adaptation allowed cleaner and faster investigation of samples. Comparison with the Seinhorst elutriator method showed a considerable reduction in the time required for population counts when the modified Baermann funnel method was used. H. Jacks

2069—WARD, C. H., 1959. "A simple method for maintaining single-species cultures of nematodes in the greenhouse." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] **Phytopathology**, **49** (9), 553–554.

Where pot-cultures of selected nematode species were required uncontaminated by other forms, the clean cultures were placed inside polythene bags extending 2 ft. to 3 ft. above the pot and held open above by rings and supports. Plant growth appeared normal and cultures remained uncontaminated for at least four months. C. C. Doncaster

Geographical Distribution

See also Nos.: 1596, 1602, 1632, 1642, 1651, 1661, 1664, 1666, 1668, 1672, 1678, 1688, 1690, 1691, 1693, 1698, 1710, 1719, 1736, 1746, 1749, 1776, 1777, 1780, 1785, 1786, 1787, 1789, 1796, 1801, 1803, 1806, 1809, 1814, 1819, 1826, 1828, 1829, 1830, 1832, 1833, 1834, 1835, 1838, 1839, 1842, 1847, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1864, 1865, 1866, 1867, 1868, 1873, 1874, 1876, 1877, 1881, 1890, 1895, 1897, 1898, 1906, 1909, 1911, 1915, 1966, 1974, 1980, 2002, 2090, 2092, 2093, 2104, 2119, 2121, 2134, 2138, 2156, 2183, 2240, 2329, 2332.

2070—DAVIS, T. R. A., 1957. [Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska.] "Hydatid disease in Alaska." **American Journal of Medicine**, **23** (1), 99–106.

Davis reviews the position concerning echinococcosis, which is wide-spread in Alaska both on the mainland and in the Bering Sea Islands. Two aetiological agents—*Echinococcus granulosus* and *E. alveolaris*—with widely differing epizootiological and epidemiological characteristics have been demonstrated. Much further field and laboratory investigation is necessary before the significance of the disease can be understood and its control achieved. J. M. Watson

2071—DOLLFUS, R. P., 1959. "Addenda à 'Cours d'helminthologie I.—Trématodes, sous-classe Aspidogastrea'." **Annales de Parasitologie Humaine et Comparée**, **34** (5/6), 623–624.

Dollfus adds several geographical records of aspidogastrids to his larger account [for abstract see *Helm. Abs.*, **27**, No. 191a]. E. I. Sillman

- 2072**—KOPIRIN, A. V., 1959. [Bibliography of helminthology in Siberia and the Urals.] *Sbronik Nauchnikh Rabot Sibirskogo Nauchno-Issledovatel'skogo Veterinarnogo Instituta*, 8, 169–187. [In Russian.]

In this comprehensive bibliography of helminthology in Siberia and the Urals, the papers are classified under individual animal hosts. Two works on eelworms are also included.

G. I. Pozniak

- 2073**—KORTHALS, A. & SHENMAN, G., 1960. [Institute of Medical and Veterinary Science, Adelaide, South Australia.] "The lungworm *Protostrongylus rufescens* in Australia." [Correspondence.] *Nature, London*, 185 (4717), 941.

The lungworm *Protostrongylus rufescens* has now been identified in sheep in Australia, the adults having been found at Millicent, South Australia and the larvae at Kojonup in the south-west of Western Australia. The pathological findings in the lungs of sheep were scattered, yellowish grey, consolidated patches of irregular shape 3–15 mm. in diameter. The worms were found mostly in clumps of up to ten obstructing bronchioles but some were lying in the larger air vessels.

K. R. Heath

- 2074**—KOTLÁN, A., 1958. [Institut f. Allg. Zoologie und Parasitologie, Veterinärmedizinische Hochschule, Budapest, Hungary.] "Zur Kenntnis der Paramphistomiden Ungarns." *Acta Veterinaria, Budapest*, 8 (1), 93–104.

Kotlán discusses the significance of diagnostic characters in Näsmark's classification of Paramphistomidae. He then reports the finding, for the first time in Hungary, of *Paramphistomum microbothrium* (which was found in cattle on three occasions) and *P. microbothrioides* (which occurred frequently). The two species are redescribed and illustrated by four photomicrographs. The only other record for European ruminants of paramphistomes with a genital atrium of the *Microbothrium* (*Clavula*) type was by Willmott (1950) of *P. microbothrium* from France.

G. I. Pozniak

- 2075**—LUKIN, E. I., 1960. [Kafedra zoologii, Kharkovski zootehnicheskii institut, U.S.S.R.] [Species of the leech fauna of China and Japan found in the Amur basin of the U.S.S.R.] *Zoologicheskii Zhurnal*, 39 (1), 40–44. [In Russian: English summary p. 44.]

Lukin gives the distribution of *Trachelobdella sinensis*, *Helobdella muda*, *Glossiphonia weberi* and *Whitmania laevis* in Russia, where they were only found in the Amur basin, although they seem to be widely distributed in China and Japan. It is suggested that these leeches are the remnants of the thermophilous fauna which used to be widely distributed in Siberia and Central Asia. Some other examples are given to corroborate this view.

N. Jones

- 2076**—MANN, K. H., 1959. [Department of Zoology, The University, Reading, U.K.] "On *Trocheta bykovskii* Gedroyé, 1913, a leech new to the British fauna, with notes on the taxonomy and ecology of other Erpobdellidae." *Proceedings of the Zoological Society of London*, 132 (3), 369–379.

Specimens of leeches recorded from Windermere and near Belfast have the genital pores separated by two annuli and the ovisacs overlying only three ganglia of the nerve cord in contrast to *Trocheta subviridis* and are identified as *T. bykovskii*; this is the first record of this species in the British Isles. Mann figures and describes the female reproductive system in *Erpobdella octoculata* and *E. testacea* in which the ovisacs form a single loop, in contrast to the much convoluted and compact ovisacs in *Dina lineata* and on this basis retains the genus *Dina*. He considers that *T. bykovskii* is now colonizing streams entering Lake Windermere and briefly describes erpobdellid habitat preferences.

L. R. Richardson

- 2077**—MYERS, B. J., 1960. [Institute of Parasitology, McGill University, Macdonald College P.O., Quebec, Canada.] "A note on some helminths from Malayan animals." *Canadian Journal of Zoology*, 38 (2), 440–441.

Myers lists the nematodes collected from a series of Malayan animals and indicates the geographical location where each host was captured.

G. A. Webster

2078—PEARSON, J. C., 1960. [University of Queensland Veterinary School.] "New records of trematodes from the cat." *Australian Veterinary Journal*, **36** (3), 93.

Five species of heterophyid trematodes were recorded from the domestic cat for the first time in Australia. Only small numbers were found in the cat which does not appear to be a normal host as large numbers of these same species were recovered from a variety of native mammals and birds. R. F. Riek

2079—SARWAR, M. M., 1957. [Chadda Building, Khawja Dil Mohd Road, Lahore, West Pakistan.] "Epidemiology and geographical distribution of amphistomiasis in West Pakistan." [Abstract.] *Proceedings of the Pakistan Science Conference*, 9th (1957), Part III, p. 126.

Sarwar points out the existence of a high rate of amphistome infection in domestic ruminants in West Pakistan, the extent and severity of the infection being found proportional to the extent of monsoon inundations and the waterlogging. Geographically the affected areas belong to the alluvial plains extending south-west of the Salt Range and are covered by the canal irrigation system. The hill tracts and the Trans-Salt Range plateau remain unaffected.

M. M. Sarwar

2080—SHOHO, C., 1959. [Department of Parasitology, Institute for Microbial Diseases, University of Osaka, Japan.] "On the identity of bovine *Setaria* in the Northern Hemisphere." *International Veterinary Congress (16th), Madrid*, May 21-27, 1959. Vol II, pp. 581-584.

After examining specimens of bovine *Setaria* sent from various parts of the Northern Hemisphere and studying the relevant literature, Shoho concludes provisionally that there are two distinct areas of distribution for *S. labiato-papillosa* and *S. digitata*. *S. labiato-papillosa* is distributed over Europe, North Africa, North America and northern South America, and *S. digitata* is distributed over Ceylon, South India, Viet Nam and Japan; both species occur together in Malaya and North India. [The other points made in this paper have already been reported; for abstracts see Helm. Abs., **27**, Nos. 221a & 221b.] G. I. Pozniak

Cytology and Genetics

See also Nos.: 1914, 2028, 2194, 2276.

2081—ANDERSON, R. C., 1960. [Department of Parasitology, Ontario Research Foundation, Toronto 5, Ontario, Canada.] "The origin of the protuberance on the inner surface of the egg capsule of *Cystidicola cristivomeri*." *Canadian Journal of Zoology*, **38** (2), 257-260.

Anderson has studied the origin of the small protuberance on the inner surface of the egg capsule of *Cystidicola cristivomeri* (Nematoda) and has established that it is the first polar body. W. G. Inglis

2082—BOGOMOLOVA, N. A., 1957. [Leningradski sanitarno-gigienicheski meditsinski institut.] [Cytochemical examination of the miracidium of *Fasciola hepatica* L.] *Dokladi Akademii Nauk SSSR*, **117** (2), 313-315. [In Russian.]

Bogomolova had studied cytochemically the distribution of nucleic acids (DNA and RNA), proteins, glycogens and fats in the miracidium of *Fasciola hepatica*. The results show that the germinal cells of the miracidium, being rich in nucleic acids and proteins and lacking reserve food substances, have greatest similarity to the sex cells of adult flukes, but they do not allow differentiation of the germinal cells into male and female cells. G. I. Pozniak

2083—FAVARD, P., 1959. [École Normale Supérieure, Laboratoire de Botanique et Laboratoire de Synthèse atomique de C.N.R.S., Ivry sur Seine, France.] "L'évolution de l'ergastoplasme dans les spermatozoïdes d'*Ascaris*." *Comptes Rendus des Séances de l'Académie des Sciences. Paris*, **248** (23), 3344-3346.

Favard has used the electron microscope to study the various stages in the elimination of the cytophore during development of the spermatid in *Parascaris equorum* and this furnishes a good example of the continuous evolution of the ergastoplasm and the ceaseless transformations in its ultrastructure. At the end of the second maturation division it is in the form of an endoplasmic reticulum. When the chromosomes have become settled at the pole to form

the spermatid nucleus, the marginal zones of the cytoplasm appear darker than the rest of the cell and the structure of layers and associated grains is then characteristic of organized ergastoplasm. Dispersed in several cortical zones the ergastoplasm develops to form a broad cap in one hemisphere of the cell. There is then a notable change in the surface tensions of the cell in these regions and evidence for this is provided by the appearance of numerous microvillousities on the surface in these, but not on other, parts of the cell. It is finally expelled as a multilobulate mass which detaches itself from the spermatid carrying with it granules of ascaridine. This confirms that the expulsion of the cytophore is more the consequence of physical phenomena than a specific activity of the cell. The cytophore then degenerates. The processes are described in detail and illustrated by photomicrographs. S. Willmott

2084—JOHN, B., 1957. [Department of Zoology & Comparative Anatomy, University College of South Wales and Monmouthshire, Cardiff, Wales.] "The chromosomes of zooparasites. I. *Acanthocephalus ranae* (Acanthocephala: Echinorhynchidae)." *Chromosoma. Berlin*, 8 (7), 730-738.

John studied the chromosomes of *Acanthocephalus ranae* in squash preparations stained with acetic orcein, and reports eight metacentric mitotic chromosomes, of which two are medio-centric (= sex chromosomes), homozygous female and heterozygous male. Egg meiosis is initiated by the sperm nucleus, the contribution of which may produce variations in the pattern of egg maturation. W. G. Inglis

2085—JOHN, B., 1957. [Department of Zoology & Comparative Anatomy, University College of South Wales and Monmouthshire, Cardiff, Wales.] "The chromosomes of zooparasites. II. *Oswaldocruzia filiformis* (Nematoda: Trichostrongylidae)." *Chromosoma. Berlin*, 9 (1), 61-68.

John studied the chromosomes of *Oswaldocruzia filiformis* and found ten autosomes in the diploid complement with, in addition, a sex (X) univalent in the male and two such chromosomes in the female. The segregation of the unpaired X is variable which suggests that the XO system is of recent origin. The meiotic centromere may divide before the first anaphase and the nuclei of the gonadal epithelium are endopolyploid, originating by endo-mitosis. W. G. Inglis

2086—TOKIN, I. B., 1957. [Laboratoriya elektronnoi mikroskopii, Akademiya nauk SSSR, Moskva, U.S.S.R.] [Electron microscope examination of basophilic structures in *Parascaris equorum*.] *Dokladi Akademii Nauk SSSR*, 116 (3), 497-500. [In Russian.]

The fine structure of *Parascaris equorum* oocytes was studied by electron microscopy. It was found that : (i) with the accumulation of basophils the cytoplasm appeared rich in ultra-microscopic structures whose nature and form is expressed in the term "ergastoplasmic net"; (ii) chondriosomes were abundant and of characteristic structure; (iii) the observed polymorphism of the chondriosomes could be considered as stages in their formation; (iv) different types of chondriosome division occurred. Close topographic relationships of young chondriosomes with the ergastoplasmic apparatus were observed, suggesting the participation of the ergastoplasm in the new formation of chondriosomes. G. I. Pozniak

2087—WOLCOTT, G. B., 1959. [Laboratory of Tropical Diseases, National Institute of Allergy & Infectious Diseases, P.O. Box 717, Columbia, S. Carolina, U.S.A.] "The chromosomes of *Diphyllobothrium ursi*." *Journal of Parasitology*, 45 (4), 378, 384.

Three specimens of *Diphyllobothrium ursi* Rausch, 1954, a pseudophyllid naturally occurring in bears, were obtained from an experimentally infected dog and fixed in Carnoy. Reaction to Feulgen staining was weak but subsequent treatment of dissected uterus and testes with Cooper & Brink's carmine and haematoxylin combination gave good results. Clear figures of meiosis in the egg showed a haploid number of nine, four of the chromosomes being very small. There are one photomicrograph, one figure and three references. J. Mahon

Morphology, Anatomy and Histology

See also Nos.: 1791, 2074, 2076, 2139, 2141, 2174.

- 2088—AGARWAL, S. M., 1959. [Zoology Dept., M.M.V., Jabalpur University, India.] "Further observations on *Euclinostomum indicum* (Bhalerao, 1942) (Trematoda: Clinostomatidae)." **Indian Journal of Helminthology**, Year 1958, **10** (1), 31–39.

Agarwal describes for the first time the adult *Euclinostomum indicum*, known previously from the metacercaria, from specimens found in the mouth cavity of *Bubulcus ibis*, experimentally fed *Ophicephalus punctatus*. *E. indicum* is generally similar to the only other described species of the genus, *E. heterostomum*, but differs from it in the smaller size of the body, the presence of a well-developed muscular pharynx in the metacercaria and adult, and the presence of a distinct and well developed vitelline reservoir. Agarwal indicates that the so-called oesophagus in clinostomatids is really a prepharynx, which may or may not be followed by a pharynx. He suggests the occurrence of three types of clinostomatid cercaria: (i) those with a thick muscular pharynx (*E. indicum* type), (ii) those with a bulbous dilatation succeeding the prepharynx (*Clinostomum* type), and (iii) those without any sign of one or the other (*E. heterostomum* and *Clinostomoides* type), and these conditions persist through metacercarial and adult stages. Keys to species of known metacercariae and adults of *Euclinostomum* are given. In a note to the latter key Agarwal opines that the three specimens from the Belgian Congo referred by Dollfus (1950) to *E. heterostomum*, should have new specific status because of the body size, the point of opening of the uteroduct in the uterine sac, the position of the gonads and the comparative sizes of the testes.

E. I. Sillman

- 2089—AGARWAL, S. M., 1959. [Zoology Department, M.M.V., Jabalpur University, India.] "Further observations on *Thapariella anastomusa* (Srivastava, 1953). (Trematoda: Thapariellidae)." **Indian Journal of Helminthology**, Year 1958, **10** (1), 40–45.

Agarwal describes the metacercaria of *Thapariella anastomusa* found in a piece of snail tissue in the mouth cavity of *Anastomus oscitans*. Certain features of the adult and metacercaria are discussed, these suggesting the possibility of inclusion of this form in the family Brachylaemidae.

E. I. Sillman

- 2090—ANDERSON, R. C., 1960. [Department of Parasitology, Ontario Research Foundation, Toronto 5, Ontario, Canada.] "A study of *Filaria martis* Gmelin, 1790 from *Martes foina* and *Pedetes caffer*." **Canadian Journal of Zoology**, **38** (1), 157–167.

Anderson redescribes *Filaria martis* Gmelin, 1790 from specimens from *Martes foina* and *Pedetes caffer* from Italy and Africa respectively. The specimens from the latter host differed from those from the former in that the female tail bears a rounded terminal area with minute tubercles and the egg capsules lack a protein component. The otherwise great similarities between the specimens from the two hosts lead the author to conclude that, although the hosts are from widely different geographical areas, the parasites are in fact conspecific. The first-stage larva is described and lacks spines or cephalic cuticular ornamentation. The genus *Filaria* is reviewed and it is concluded that only two species are well characterized, *F. martis* and *F. cephalophi* Chabaud & Rousselot, 1956. *F. hyracis* is probably a synonym of *F. martis*; *F. texensis* and *F. conepti* are conspecific with *F. carvalhoi* Freitas & Lent, 1937, but the status of this latter species needs clarification as it is perhaps a synonym of *F. martis*. W. G. Inglis

- 2091—CHENG, T. C., 1959. [Department of Histology and Embryology, Dental School, University of Maryland, Baltimore, Maryland, U.S.A.] "The histology of the prostate mass in the genus *Acanthatrium* (Trematoda: Lecithodendriidae)." **Proceedings of the Helminthological Society of Washington**, **26** (2), 111–113.

Cheng gives a comparative account of the histology and arrangement of the male reproductive system in *Acanthatrium pipistrelli* and *A. oligacanthum*. In *A. pipistrelli* the atrial wall is thick and clearly visible, the ejaculatory duct and prostate glands open independently into the genital atrium and the prostate glands are larger. In *A. oligacanthum* the wall of the atrium is not so easily visible, the prostate glands open into the ejaculatory duct before it enters the atrium, and the prostate glands are smaller. This arrangement is believed to be more primitive than that in *Phaneropsolus* and *Parabascus*, and *Acanthatrium* is considered to be one of the lower members of the Lecithodendriidae.

S. Willmott

- 2092**—FERRETTI, G. & CORTINI, M., 1959. [Istituto di Parassitologia dell'Università di Roma, Italy.] "Si una rara malformazione osservata in un brachilemide, *Dollfusinus frontalis*." **Parassitologia. Rome**, **1** (2), 167–168. [English summary p. 168.]
 Ferretti & Cortini describe and illustrate an anomalous specimen of *Dollfusinus frontalis* Biocca & Ferretti, 1958. The anomaly consisted of the presence of two ventral suckers, each having an independent origin. It was found, together with other normal specimens, in the nasal sinuses of an *Erinaceus europaeus* captured in the Latium Region. N. Jones
- 2093**—FREITAS, J. F. TEIXEIRA DE & DOBBIN, Jr., J. E., 1957. [Instituto Oswaldo Cruz, Rio de Janeiro, D.F.] "Sobre *Travtrema stenocotyle* (Cohn, 1902) (Trematoda, Plagiorchoidea)." **Boletim do Museu Nacional, Rio de Janeiro. Nova série zoologia**, No. 170, 25 pp.
 After giving the list of synonyms of *Travtreminae* Goodman, 1951 and of *Travtrema*, the authors redescribe *T. stenocotyle*. The paper includes 25 figures and a table showing some variations in morphology and size according to the location and host. The hosts in question are : *Liophis miliaris*, *Phyalodryas* sp., *Bothrops* sp. and *Leimadophis poecilogyrus*. The parasite was found in the states of Mato Grosso and Rio de Janeiro. N. Jones
- 2094**—HOLLIS, J. P., & WHITLOCK, L. S., 1959. "Variants of *Tylenchorhynchus martini* and *T. ewingi*." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] **Phytopathology**, **49** (9), 541.
 Certain variants of *Tylenchorhynchus martini*, unlike *T. ewingi*, reproduced on rice in the greenhouse. *T. ewingi* differs from all variants of *T. martini* in having a post-anal intestinal extension, four head annules and a tail. Variants with a dorsal hump or bifid tails were observed in small numbers. J. B. Goodey
- 2095**—KRUIDENIER, F. J., 1959. [University of Illinois, Urbana, Illinois, U.S.A.] "Ultrastructure of the excretory system of cercariae." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 59.
 Ultra-thin sections of the cercariae of *Schistosoma mansoni* and *Tetrapapillatrema concavocarpa* were studied by means of the electron microscope. The structure and arrangement of the cilia of flame cells, the walls of the excretory tubes and the epithelial bladder are described. N. A. Hancock
- 2096**—LAUTENSCHLAGER, E. W. & CARDELL, Jr., R. R., 1959. "Ultrastructure of the surface layers of a strigeid metacercaria, *Diplostomulum trituri*, and an echinostome cercaria, *Himasthla quissetensis*." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 18.
 Sections of *Diplostomulum trituri* and *Himasthla quissetensis* were studied with an electron microscope and the method is compared with the optical microscope. The latter shows a stratification of the surface layers of *D. trituri*, with an outer homogeneous layer and an inner layer half as thick. The electron microscope showed that the outer layer contains microstructures including numerous "micro-canals" and irregular, rod-like, osmophilic elements. The surface structure of *H. quissetensis* also showed an outer homogeneous layer and a basal layer when viewed by the light microscope. The outer layer was found to contain "micro-canals" and oblong osmophilic elements, while the basal layer appears as a repeating pattern of osmophilic bodies. Dimensions of the micro-structures are given. N. A. Hancock
- 2097**—LEE, D. L., 1959. [Moltano Institute, Cambridge, U.K.] "The nervous system of *Thelastoma bulhõesi* (Magalhães, 1900; Travassos, 1929), a nematode parasitic in cockroaches." **Parasitology**, **49** (3/4), 473–476.
 Minor differences distinguish the nervous system of the female *Thelastoma bulhõesi* from that of most nematodes, namely, one rather than two cells in the dorsal ganglion, 19 cells in the lateral and 13 in each of the two ventral ganglia, and a paired ventral nerve between the post-vulval and pre-anal ganglia. Three arcade cells are present in the head of both male and female. H. E. Welch

- 2098—LOGACHEV, E. D., 1960. [Kemerovski gosudarstvenni meditsinski institut, U.S.S.R.] [The trophic function of the intestinal epithelium in trematodes.] **Dokladi Akademii Nauk SSSR**, **131** (3), 709–712. [In Russian.]

Logachev reports on his studies of the dynamics of the morphological changes in different parts of the intestinal epithelium of mature *Fasciola hepatica* during digestion. He describes the structure of the wall of the median part of the intestine and of the epithelium of the main tube and the lateral branches. These epithelia are both composed of a single cellular layer. There are more contractile fibres in the principal part of the intestine. In the intestinal sections containing food, the cytoplasm of the epithelial cells is clearly differentiated into basal basophil and apical oxyphilous parts. The nucleus is always localized in the basophil part of the cell. The author gives further cytological details and illustrates the paper with photomicrographs.

N. Jones

- 2099—METTRICK, D. F., 1959. [University College of Rhodesia and Nyasaland, Private Bag 167H, Salisbury, Southern Rhodesia.] "*Zygocotyle lunata*. A re-description of *Zygocotyle lunata* (Diesing, 1836), Stunkard, from *Anas platyrhynchos domesticus* in Southern Rhodesia." **Rhodesia Agricultural Journal**, **56** (5), 197–198.

The specimens of *Zygocotyle lunata* (Diesing, 1836), collected from Aylesbury ducks on a farm near Salisbury, Southern Rhodesia, differ from those previously described chiefly in the extent and distribution of the vitellaria, the small size of the eggs and the size of the pharyngeal pouches. The history and synonymy of the species is briefly reviewed and a host list is given (which is now incomplete).

D. F. Mettrick

- 2100—MIYAZAKI, I., 1959. [Department of Parasitology, Faculty of Medicine, Kyushu University, Fukuoka, Japan.] "Four species of *Paragonimus* occurring in Japan." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 20.

Miyazaki enumerates four species of *Paragonimus* found in Japan, *P. westermani*, *P. ohirai*, *P. iloktsuenensis* and *P. kellicotti*, and describes their differential points, namely arrangement of cuticular spines, shape of the ovary and size of the testes in adults and, in the metacercariae, the shape of cysts, number and type of cyst layers, and size of excysted larvae. The first and second intermediate hosts of *P. westermani* and *P. ohirai* are listed, with the second intermediate host only of *P. iloktsuenensis*. *Eriocheir japonicus* is stated to be the most significant vector of human paragonimiasis in Japan.

N. A. Hancock

- 2101—MIYAZAWA, M., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [Studies on the secretion and excretion systems of *Setaria cervi*. I. On the morphology of microfilariae.] **Acta Scholae Medicinalis in Gifu**, **7** (2), 510–516. [In Japanese: English summary p. 510.]

In microfilariae of *Setaria cervi*, anlage cell groups corresponding to cephalic gland, lateral lines, excretory system, cervical gland, gonads, oesophagus, oesophageal gland, and intestines were recognized.

Y. Yamao

- 2102—MEYERS, B. J., 1960. [Institute of Parasitology, McGill University, Macdonald College P.O., Quebec, Canada.] "On the morphology and life history of *Phocanema decipiens* (Krabbe, 1878) Meyers, 1959 (Nematoda: Anisakidae)." **Canadian Journal of Zoology**, **38** (2), 331–344.

Meyers redescribes *Phocanema decipiens* (Krabbe, 1878) in detail and outlines its possible life-cycle. The eggs develop in salt water and hatch in 7 to 14 days, at 10°C. to 24°C., even after freezing. Temperatures over 24°C. are lethal. Larvae were fed to a very wide range of invertebrates in an attempt to establish an intermediate host but all without success. The author suggests that some invertebrates may act as transport hosts, although the larvae survive for only 24 hours, but that fish are a more likely source of infection. Development to maturity in the seal takes approximately three weeks.

W. G. Inglis

- 2103—PRESTAGE, J. J., 1960. [Department of Zoology, State University of Iowa, Iowa City, Iowa, U.S.A.] "The fine structure of the growth region of ovary in *Ascaris lumbricoides* var. *suum* with special reference to the rachis." **Journal of Parasitology**, **46** (1), 69–78.

Prestage has investigated the growth region of the ovary of pig ascaris by electron microscopy. By means of 17 photomicrographs he presents evidence which indicates that the rachis represents a syncytium of germ cells and that it is in protoplasmic continuity with the primary

oocytes, but that it is not a continuation of the terminal cell of the ovary and is not derived from incomplete division of the germ cells. Prestage considers that the function of the rachis is as a nutritive reservoir for the oocytes.

J. F. A. Sprent

2104—RAUSCH, R., 1959. [Arctic Health Research Centre, Anchorage, Alaska.] "Studies on the helminth fauna of Alaska. XXXV. On the identity of certain cestodes (Taeniidae) from foxes." *Proceedings of the Helminthological Society of Washington*, **26** (2), 125–131.

Rausch reviews the cause of confusion between the two species of *Taenia* occurring in foxes in Northern regions, *T. crassiceps* (Zeder, 1800) and *T. polyacantha* Leuckart, 1856 and redefines the morphological characteristics of these two species based on material collected in Alaska. *T. crassiceps* has 28–32 rostellar hooks, the large ones measuring 172–178 μ and the small ones 121–136 μ , whereas *T. polyacantha* has 44–50 hooks measuring 200–214 μ and 142–157 μ . Drawings of the hooks of these two species show distinct differences in shape. In *T. crassiceps*, the cirrus pouch is elongate, measuring 160–215 μ by 50–70 μ , and in *T. polyacantha* it is sub-spherical, measuring 140–215 μ by 140–180 μ . There are 16–20 lateral uterine branches on one side in *T. crassiceps* and 12–16 in *T. polyacantha*. The larvae of both species occur in microtine rodents, that of *T. crassiceps*, which was described by Rudolphi (1819) as *Cysticercus longicollis*, being a small translucent bladderworm and quite distinct from the larger, opaque and superficially annulated larva of *T. polyacantha*. After studying the characteristics of *T. hyperborea* von Linstow, 1905, Rausch concludes that this species is synonymous with *T. crassiceps*. There are two photographs, six figures, one table and 14 references.

J. Mahon

2105—ROTHMAN, A. H., 1959. "The physiology of tapeworms, correlated to structures seen with the electron microscope." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 28.

Rothman reports that flame cells observed throughout the length of *Hymenolepis diminuta* had cilia with typical fibril distribution, and that microtriches cover the surface of the worm. It is considered that the cuticle should be renamed as the tegument, since it is not an inert region, having numerous mitochondria and pore canals and being capable of reducing tetrazolium. Possible uses and connections of the pore canals are discussed.

N. A. Hancock

2106—SCHILLER, E. L., 1959. [Department of Pathobiology, School of Hygiene & Public Health, John Hopkins University, Baltimore, Maryland, U.S.A.] "Experimental studies on morphological variation in the cestode genus *Hymenolepis*. IV. Influence of the host on variation in *H. nana*." *Experimental Parasitology*, **New York**, **8** (6), 581–590.

Sterility and reduction in numbers of testes were compared in 15-day infections of *Hymenolepis nana* in different host species to determine the influence of the host on intraspecific variation in the tapeworm. As with white mice, those worms in white hamsters, *Marmota*, *Dipodomys* and *Oryzomys* had fewer than 3% of their proglottides with only two testes, while in *Sciurus*, *Tamiasciurus* and *Glaucomys*, worms with only two testes occurred in 4.6% to 5.3% of the proglottides. This was of approximately the same magnitude as that produced by 5+kr. of X-irradiation. The number of sterile proglottides was similar in *Oryzomys* to that in white mice, but greater numbers occurred in all other experimental host species. The distribution of the worms in the small intestine may be influenced by the host also. It is concluded that the frequency of variant characteristics in *H. nana* appears to be affected by the host species.

G. K. Sweatman

2107—TOMIMURA, T., 1959. [Department of Veterinary Science, College of Agriculture, University of Osaka Prefecture, Sakai, Japan.] [Comparative studies on the specific characters between the two species of lung-flukes, *Paragonimus ohirai* Miyazaki, 1939 and *P. iloktsuenensis* Chen, 1940. 1. Comparisons of the size of the testes and ovary, with special reference to worms from inoculated dogs.] *Japanese Journal of Parasitology*, **8** (4), 464–478. [In Japanese: English summary pp. 471–472.]

Dogs were experimentally infected with *Paragonimus ohirai* and *P. iloktsuenensis* which were removed 30, 60, 90 and 120 days after the infection. The whole worm body was flattened to a certain thickness and the total body area as well as the area of testis and ovary was measured by

a planimeter. Indexes such as
$$\frac{\text{area of testis (right and left combined)}}{\text{area of total body}} \times 100,$$

$$\frac{\text{area of ovary}}{\text{area of total body}} \times 100, \quad \frac{\text{area of testis (average of the right and left)}}{\text{area of ovary}} \times 100,$$

$$\frac{\text{length of the body}}{\text{length of testis}} \times 100$$

were calculated. The indexes were compared in both species, and those of the one generally differed from those of the other. When the indexes could not distinguish the one from the other, one could depend on the shape and nature of the egg for the classification. Y. Yamao

- 2108—TOMIMURA, T., 1959. [Department of Veterinary Science, College of Agriculture, University of Osaka Prefecture, Sakai, Japan.] [Comparative studies on the specific characters between the two species of lung-flukes, *Paragonimus ohirai* Miyazaki, 1939 and *P. iloktsuenensis* Chen, 1940. 2. Comparisons of the testes and ovary, with special reference to worms from inoculated white rats.] **Japanese Journal of Parasitology**, 8 (4), 479–494. [In Japanese: English summary pp. 487–488.]

Using albino rats as experimental animals for *Paragonimus ohirai* and *P. iloktsuenensis* infection, the author obtained the same result regarding the indexes previously reported [see abstract No. 2107 above] which again successfully distinguished the one species of *Paragonimus* from the other. Y. Yamao

- 2109—TOMIMURA, T., 1959. [Department of Veterinary Science, College of Agriculture, University of Osaka Prefecture, Sakai, Japan.] [Comparative studies on the specific characters between the two species of lung-flukes, *Paragonimus ohirai* Miyazaki, 1939 and *P. iloktsuenensis* Chen, 1940. 3. Comparisons of the testes and ovary, with special reference to worms from inoculated cats.] **Japanese Journal of Parasitology**, 8 (4), 495–508. [In Japanese: English summary pp. 501–502.]

In cats, experimentally infected with *Paragonimus ohirai* and *P. iloktsuenensis*, the indexes, which Tomimura reported in previous papers [see abstracts Nos. 2107 & 2108 above] could distinguish *P. ohirai* from *P. iloktsuenensis* and vice versa. Y. Yamao

- 2110—TRIANTAPHYLLOU, A. C. & SASSER, J. N., 1959. "Morphological and physiological variation in *Meloidogyne incognita* and *M. incognita acrita*." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] **Phytopathology**, 49 (9), 553.

Triantaphyllou & Sasser propagated on tomato for 12 generations 14 single egg mass or larval isolates from 12 root-knot populations. In many isolates perineal patterns ranged from that typical of *incognita* to that typical of *acrita*. Specific characteristics persisted through 12 generations. Morphology was not influenced by host or by selection. Cross-sections of the *acrita* pattern showed regular cuticular striae and folds of the outer cuticle. Most isolates reproduced slightly on resistant tobacco and resistant tomato and on these plants clones were built up with increased reproductive rates. Clones built up on resistant tobacco reproduced on resistant tomato at the original rate. M. T. Franklin

- 2111—VOGE, M., 1960. [Department of Infectious Diseases, School of Medicine, University of California, Los Angeles, U.S.A.] "Studies in cysticeroid histology. I. Observations on the fully developed cysticeroid of *Hymenolepis diminuta* (Cestoda: Cyclophyllidae)." **Proceedings of the Helminthological Society of Washington**, 27 (1), 32–36.

Voge describes and illustrates the histology of the fully developed cysticeroid of *Hymenolepis diminuta*, and notes preliminary observations on developmental stages. E. I. Sillman

- 2112—WAGNER, A., 1959. "Papillae on schistosome cercariae." [Abstract.] **Journal of Parasitology**, 45 (4, Sect. 2), 59.

Cercariae of *Schistosoma mansoni*, *Schistosomatium douthitti* and *Ornithobilharzia canaliculata* were fixed by osmium tetroxide and impregnated with silver nitrate. All three species showed variation in number and position of surface papillae, most of which bore a seta, and anterior structures of the cercaria which have been described as "penetration spines" are believed to be analogous to the papillae on the rest of the body. The possible use of these structures in taxonomy is mentioned. N. A. Hancock

2113—WILLIAMS, J. B., 1959. [Department of Parasitology, London School of Hygiene and Tropical Medicine, London, W.C.1.] "Preliminary note on the anatomy of a polystome from the bladder of *Xenopus laevis* Daud." **Journal of Helminthology**, **33** (2/3), 207–208.

A polystome, of which two immature and one mature specimens were collected from *Xenopus laevis*, is provisionally identified as *Protopolystoma xenopi* (Price, 1943) Bikhovski, 1957. This material differs from Price's original description in that the intestinal crura unite posteriorly and are joined by a number of transverse branches and the penial coronet is comprised of eight large and eight small spines set alternately. The structure of the worm, lacking uterus and vagina, resembles that of the neotenic form of *Polystoma*. S. Willmott

2114—WU, L. Y., 1960. [Nematology Section, Entomology Research Institute, Canada Department of Agriculture, Ottawa, Canada.] "Further observations on the morphology of *Ditylenchus destructor* Thorne, 1945 (Nematoda: Tylenchidae)." **Canadian Journal of Zoology**, **38** (1), 47–49.

Wu reports that the lips of *Ditylenchus destructor* have faint annules, that although the usual number of incisures on the lateral fields is six it may be as many as eleven. She was unable to see head papillae. The excretory system has a long cuticularized terminal duct joining to a lateral canal usually on the right side, and there is a large nucleus associated with the junction of canal and duct. J. B. Goodey

Life-Cycle and Development

See also Nos. 1649, 1696, 1733, 1793, 1896, 1976, 2041, 2081, 2088, 2090, 2100, 2102, 2193

2115—ALLEN, R. W., 1959. [Animal Disease & Parasite Research Division, U.S. Department of Agriculture, University Park, New Mexico, U.S.A.] "Preliminary note on the larval development of the fringed tapeworm of sheep, *Thysanosoma actinioides* Diesing, 1834, in psocids (Psocoptera: Corrodentia)." **Journal of Parasitology**, **45** (5), 537–538.

This is the first report of the development of eggs of *Thysanosoma actinioides*, an anoplocephalid occurring in wild and domestic ruminants in the Americas, fed to two species of psocid insects, not previously recorded as intermediate hosts for parasitic helminths. These insects were collected from the Jackson Hole area, Wyoming and cultured in the laboratory. In *Liposcelis bostrychophilus* the larvae reached only the early blastula stage, but from *Rhyopsocus* sp. fully developed cysticeroids were recovered. There are two photomicrographs. J. Mahon

2116—BENNINGTON, E. & PRATT, I., 1960. [U.S.P.H.S., Training Branch, CDC, Atlanta, Georgia, U.S.A.] "The life history of the salmon-poisoning fluke, *Nanophyetus salmincola* (Chapin)." **Journal of Parasitology**, **46** (1), 91–100.

Bennington & Pratt identify and describe the major stages of the life-history of *Nanophyetus salmincola* from experimentally reared material. Miracidia required from 87 to 200 days of incubation at room temperature to hatch; they did not hatch in running water. No sporocysts could be found in *Oxytrema silicula* exposed to the miracidia, but rediae and cercariae were found in all tissues and especially in the digestive gland of the host snail. Apparently there is only one redial generation. Cercariae are released from the snail in large numbers in mucous threads and, once in contact with the fish host, penetrate rapidly at any point. Cercariae encyst in the internal organs but frequently rupture the thin cyst wall, move about in the viscera and re-encyst. Metacercariae older than ten days mature into ovigerous adults in six to seven days in the hamster and wood rat, but are eliminated from these experimental hosts after 51 days. Of all the species of cercariae collected from *Oxytrema silicula* and exposed to young salmon, only the microcercous xiphidiocercariae of *N. salmincola* penetrated the fish. E. I. Sillman

2117—DAWES, B., 1959. [Department of Zoology, King's College, London, W.C.2.] "Penetration of the liver-fluke, *Fasciola hepatica* into the snail, *Limnaea truncatula*." [Correspondence.] **Nature**, **London**, **184** (4695), 1334–1335.

Dawes describes and illustrates by photomicrographs of sections, the penetration of *Limnaea truncatula* by *Fasciola hepatica*. The miracidium perforates the snail's integument, not by a mechanical boring action, but by the loosening, cytolysis and abstraction of epithelial cells by chemical (probably enzyme) action. During this process the miracidium loses its ciliated epithelium and becomes an early sporocyst, retaining the eyes, gut, germinal cells and other organs. S. Willmott

2118—DOUGLAS, L. T., 1959. "The early development of *Pinguinicolium pinguinicolium* (Tetraphyllidae) and of *Dasyrhynchus* sp. (Trypanorhyncha)." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 19. In *Pinguinicolium pinguinicolium*, fertilization, cleavage and later embryo development resemble these stages in cyclophyllidean cestodes, while in *Dasyrhynchus* sp. (from *Raja kincaidii*) early embryonic development is similar to that in Pseudophyllidea. N. A. Hancock

2119—GNEDINA, M. P. & OSIPOV, A. N., 1960. [The life-cycle of *Parafilaria multipapillosa* (Condamine & Drouilly, 1878), parasitic in the horse.] *Dokladi Akademii Nauk SSSR.*, **131** (5), 1219–1221. [In Russian.]

Parafilaria multipapillosa infection of horses is wide-spread in the south and south-east of the U.S.S.R. A search among naturally and experimentally infected Muscidae revealed that the intermediate host is *Haematobia atripalpis*, a small blood-sucking fly inhabiting pastures. Flies, which had been allowed to feed on infected horses, were dissected at given time intervals and the larval stages observed in the body-cavity are described. Infective larvae developed within 10 to 15 days (at air temperatures of 20°–36.5°C.), they were 1.67–2.67 mm. long and had the typically parafilariid cuticular ornamentations on the anterior end. G. I. Pozniak

2120—GNEZDILOV, V. G., 1957. [*Mesocricetus auratus* as a potential definitive host of *Diphyllobothrium latum*.] *Dokladi Akademii Nauk SSSR.*, **114** (6), 1328–1330. [In Russian.]

Looking for potential final hosts of *Diphyllobothrium latum* among non-fish-eating animals, Gnezdilov experimentally infected with plerocercoids two rabbits, two guinea-pigs, four white mice and six *Mesocricetus auratus brandti*. Five of the *M. a. brandti* became infected and passed eggs 13 to 18 days later; the infection did not take in the other animals. G. I. Pozniak

2121—GOLIKOVA, M. N., 1960. [The biology of some cestode species from aquatic birds.] *Dokladi Akademii Nauk SSSR.*, **131** (5), 1222–1224. [In Russian.]

Investigating the parasite fauna in two lakes on a bird farm in the Kaliningrad area, Golikova encountered two larval cestodes previously unknown. They were the cysticercoids of *Hymenolepis multistriata* found in three larvae of *Cloeon* (Ephemeroptera) and those of *Tatria decacantha* found in six larvae of *Agrion*. The cysticercoids, which were identified on the holdfast structure, are described and figured. In *Radix auricularia*, *Galba palustris* and *Lymnaea stagnalis*, Golikova found the cysticercoids of *H. paracompressa* and *H. paramicrosoma*, these, however, lacked the long tails described for larvae from the normal copepod intermediary. G. I. Pozniak

2122—GUTTOWA, A., 1959. [Zakład Parazytologii PAN, Warszawa, Poland.] "Pies jako ostateczny żywiciel bruzdogłowca szerokiego (*Diphyllobothrium latum* (L.))." *Wiadomości Parazytologiczne. Warsaw*, **5** (6), 585–590. [English summary p. 590.]

Guttowa infected two adult dogs with plerocercoids of *Diphyllobothrium latum* obtained from *Lota lota*. Each animal received 70–80 plerocercoids in meat balls. The older animal eliminated all parasites, which were immature, four weeks after infection. The younger dog continued to eliminate its parasites (whole single strobilae or parts of them) for another six months at more or less regular intervals. Among eliminated strobilae, mature proglottides were found. At post-mortem, 10 months after infection, no parasites were found in either dog. 45% to 50% of eggs from the strobilae eliminated by the younger dog were hatched in water at 18°C. to 20°C. The first coracidia appeared 9 to 11 days after the beginning of the experiment. The author concludes that the dog is only a substitute host of *D. latum*, man being the principal final host. N. Jones

2123—HEYNEMAN, D., 1959. [University of California, Los Angeles, California, U.S.A.] "Experimental autoreinfection of *Hymenolepis nana* in isolated mice restrained from coprophagy." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 25–26.

Mice were fed one cysticercoide and placed singly in special cages which prevented coprophagous reinfection. Controls similarly infected were placed together in an ordinary cage. After subsequent killing [time not specified], 63% of the restrained mice and 68% of the controls showed reinfection and Heyneman considers that this indicates the possibility of auto-reinfection by *Hymenolepis nana*. N. A. Hancock

- 2124**—IBRAGIMOV, M., 1957. [New experimental data on the hatching of *Ascaris suum* larvae.] **Vestnik Leningradskogo Universiteta. Seriya Biologii**, 12 (9), 106–115. [In Russian: English summary pp. 114–115.]

An experimental study of the hatching of *Ascaris suum* eggs gave the following results: in gastric juice (freshly taken from a pig) at 38.5–39.5°C., eggs which had undergone initial development for 30 to 45 days in water or soil, began to hatch after 16 hours and about half had hatched after 48 hours. This stimulating effect on hatching was reduced or lost when the pH of the gastric juice was changed, or when the juice was heated to 70° or 100°C. or centrifuged. Not more than 25% of larvae hatched in bile (from pigs and cattle) and pancreatin, and all eggs perished within two days in bile. *In vivo* experiments showed that hatching commences in the stomach (three to eight hours after the eggs reach it) and continues in the small intestine but not in the large intestine or the rectum. Hatching of eggs in contact with the mucosa took place more readily than that of eggs in the lumen.

G. I. Pozniak

- 2125**—KUNII, Y., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [Studies on *Strongyloides ratti*. I. On the development of the larvae.] **Acta Scholae Medicinalis in Gifu**, 7 (1), 63–77. [In Japanese: English summary p. 63.]

Just after an evacuation, many eggs of *Strongyloides ratti* were found in the stool. These eggs were somewhat larger than those in the uteri of *S. ratti*. Using the filter paper culture method at 33°C. the author obtained many rhabditiform larvae in the water ten hours later, while many filariform larvae were found two days later. Under the conditions of the experiment, a pH of 5.5 and a temperature of 20°C. proved to be the least favourable.

Y. Yamao

- 2126**—KUNII, Y., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [Studies on *Strongyloides ratti*. III. On the experimental infections to rats.] **Acta Scholae Medicinalis in Gifu**, 7 (1), 159–165. [In Japanese: English summary p. 159.]

When albino rats were infected subcutaneously with filariform larvae of *Strongyloides ratti*, rhabditiform larvae were found in the stools five to six days later, the largest numbers being obtained 11–25 days after infection. The larvae appeared abundantly in the lungs and peritoneal cavity 24 hours after infection and four days later most of them were found in the intestine as immature adults.

Y. Yamao

- 2127**—LUBINSKY, G., 1960. [Institute of Parasitology, McGill University, Macdonald College P.O., Quebec, Canada.] "The maintenance of *Echinococcus multilocularis sibiricensis* without the definitive host." **Canadian Journal of Zoology**, 38 (1), 149–151.

Lubinsky has transplanted cysts of *Echinococcus multilocularis sibiricensis* from cotton-rat to cotton-rat by means of intraperitoneal injections. Cysts of the fourth transfer contained scoleces and were infective to dogs. Secondary cysts of the third transfer were successfully inoculated into gerbils and white mice. An increase in growth rate was noted with successive transfers.

G. A. Webster

- 2128**—MAGATH, T. B. & THOMPSON, Jr., J. H., 1959. "The life histories of the two species of *Echinococcus* of man." [Abstract.] **Journal of Parasitology**, 45 (4, Sect. 2), 30. [This abstract refers only to an exhibition of photographs and film.]

- 2129**—MUELLER, J. F., 1959. [State University of New York, Upstate Medical Center, Syracuse, N.Y., U.S.A.] "Minimum development compatible with infectivity in the larval stages of *Spirometra mansonoides*." [Abstract.] **Journal of Parasitology**, 45 (4, Sect. 2), 26–27.

Mice were fed with copepods carrying proceroids of *Spirometra mansonoides* which were four, five, six and seven days old respectively. On examination 10 weeks later, two of the four mice fed with seven-day proceroids had small spargana in the muscles and the rest were negative. Previous observations had shown that after nine days in the copepod, proceroids were capable of massive infection. Mice fed with 21-day proceroids were fed to cats at half-day intervals from 12 to 108 hours and at one-day intervals from four to 10 days. All cats from 108 hours upwards became infected with prepatent periods of 11 to 26 days. A cat given a 108-hour mouse showed a prepatent period of 17 days, indicating a minimum development period of four-and-a-half days in the mouse.

N. A. Hancock

- 2130**—MUELLER, J. F., 1959. [State University of New York, Upstate Medical Center, Syracuse, N.Y., U.S.A.] "Substitution of a cell-free culture system for the second intermediate host in the life cycle of *Spirometra mansonoides*." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 27.
[The full account of this work appears in **J. Parasit.**, **45**, 561–573.]
- 2131**—NODA, K., 1959. "Observations on larval development of the heterophyid, *Stellantchasmus falcatus*, in snails." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 23.
[The full account of this work appears in **J. Parasit.**, **45**, 635–642. For abstract see *Helm. Abs.* **29**, No. 1470.]
- 2132**—OGREN, R. E., 1959. [Dickinson College, Carlisle, Pa., U.S.A.] "Development of epidermal glands and enclosing membranes of a dilepidid oncosphere." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 25.
[The full account of this work appears in **J. Parasit.**, **45**, 575–579; 580–585.]
- 2133**—PEARSON, J. C., 1960. [University of Queensland Veterinary School, Brisbane, Australia.] "On the life cycle of *Neodiplostomum buteonis* and the occurrence of a periprostate (Trematoda: Diplostomatidae)." **Journal of Parasitology**, **46** (1), 48.
Pearson exposed 24 *Physa* sp. to miracidia of *Neodiplostomum buteonis* from the intestine of *Nyctea scandiaca*, and cercariae from one of the snails penetrated tadpoles of *Rana clamitans* and *R. sylvatica*, developing into free diplostomula in the body-cavity. These diplostomula when fed to two *Thamnophis sirtalis* persisted in the viscera and muscles of one snake up to a year.
E. I. Sillman
- 2134**—PETROCHENKO, V. I., 1960. [The life-cycle of *Drepanidotaenia przewalskii* Skryabin, 1914, from geese.] **Dokladi Akademii Nauk SSSR.**, **130** (4), 946–948. [In Russian.]
Drepanidotaenia przewalskii is widely distributed and pathogenic among geese in the Khabarovsk Territory. The species is here redescribed including the scolex, which was found for the first time on four of several thousand worms seen. The scolex is pear-shaped, measures 0.162–0.184 mm. × 0.120–0.145 mm. and carries ten hooks of diorchoid type. The intermediate hosts of *D. przewalskii* are *Eucyclops serrulatus*, *Mesocyclops oithonoides*, *M. crassus*, *M. leuckarti* and the mollusc, *Radix auricularia*. Experimentally, infective cysticercoids were obtained in *M. oithonoides* and *E. serrulatus* within 12 days.
G. I. Pozniak
- 2135**—ROSE, J. H., 1960. [Central Veterinary Laboratory, Ministry of Agriculture, Fisheries and Food, Weybridge, Surrey, U.K.] "The field-slug *Agriolimax reticulatus* as a vector of the lungworm *Cystocaulus ocreatus*." [Correspondence.] **Nature. London**, **185** (4707), 180.
Lungworm-free lambs, which were grazed with ewes infected with *Cystocaulus ocreatus*, after several weeks shed first-stage larvae in their faeces. The only land mollusc on this pasture shown to be infected was the field slug *Agriolimax reticulatus*. It was confirmed that this slug was capable of infecting lambs by feeding the feet of experimentally infected slugs to lungworm-free lambs; after several weeks they were found to be shedding larvae. *A. reticulatus* is the commonest land mollusc in Britain and is therefore likely to be of considerable importance as a vector of *C. ocreatus*.
K. R. Heath
- 2136**—SAWADA, I., 1959. [Biological Laboratory, Nara Gakugei University, Japan.] "Feeding experiment involving small insects and earthworms with the oncosphere of *Raillietina kashiwarensis* Sawada." **Annotationes Zoologicae Japonenses**, **32** (3), 143–146.
Sawada fed senile proglottides or oncospheres of *Raillietina kashiwarensis* from the faeces of experimentally infected chickens to the same 12 insect and one earthworm species as those collected from the chicken runs where this infection was present [for abstract see *Helm. Abs.*, **29**, No. 1476]. This time, however, the insects and earthworms were collected from places free of the infection. Despite the fact that proglottides and oncospheres were eaten the attempt at infection was unsuccessful. The author concludes that under natural conditions the development of the *R. kashiwarensis* oncospheres into mature cysticercoids seems to be the commonest in ant larvae.
N. Jones

2137—SHEVCHENKO, N. N., & VERGUN, G. I., 1960. [Kharkovski gosudarstvenni universitet, U.S.S.R.] [The life-cycle of the trematode *Astiotrema monticelli* Stossich, 1904.] **Dokladi Akademii Nauk SSSR.**, 130 (4), 949–952. [In Russian.]

Astiotrema monticelli was found to infect 97% of *Natrix natrix* and 23.5% of *Vipera berus* in the river Donets. Its life-cycle has been investigated in nature and experimentally, and the redia, cercaria and metacercaria are described and figured. The first intermediate host was *Bithynia leachi* and the second intermediaries were *Pelobates fuscus*, *Rana terrestris* and *Hyla arborea*.
G. I. Pozniak

2138—SOGANDARES-BERNAL, F. & HUTTON, R. F., 1960. [Department of Zoology, Tulane University, New Orleans, Louisiana, U.S.A.] "Notes on the probable partial life-history of *Galactosomum spinetum* (Braun, 1901) (Trematoda) from the west coast of Florida." **Proceedings of the Helminthological Society of Washington**, 27 (1), 75–77.

Sogandares-Bernal & Hutton consider the large heterophyid metacercariae found encysted in the visceral adipose tissue of a single *Hyporhamphus unifasciatus* from John's Pass, to be *Galactosomum spinetum*; this is known as adults from *Rhynchops nigra* in Gasparilla Sound, Florida. Non-aggregating magnacercous cercariae from *Cerithium muscarum* from Boca Ciega Bay, Florida, produced encysted metacercariae in the flesh of *Fundulus similis*; these probably belong to another species of *Galactosomum* known to be common in gulls of that area. The authors believe it possible that the *Hyporhamphus unifasciatus* acquired its infection by feeding on positively phototropic magnacercous cercariae.
E. I. Sillman

2139—SPRENT, J. F. A., 1959. [Department of Parasitology, University of Queensland, Yeerongpilly, Brisbane, Queensland, Australia.] "The life history and development of *Toxascaris leonina* (von Linstow 1902) in the dog and cat." **Parasitology**, 49 (3/4), 330–371.

The synonyms and hosts of *Toxascaris leonina* are listed. Migrations of larvae from dog strain, cat strain, fox strain and wolf strain were studied in mice. It was found that the larvae migrated to the intestinal wall for seven days and thence to the liver, lungs and carcass. No differences in migratory behaviour between strains was observed, but the dog, wolf and fox strains larvae attained a slightly greater length. Cellular changes in the intestinal wall, liver, lungs and somatic tissues are described. Cats were successfully infected by feeding eggs of the feline strain, and by feeding feline-strain and canine-strain infected mice. Dogs were successfully infected by canine-strain and feline-strain eggs, and by feeding canine-strain infected mice. It was concluded that the two strains constitute a single species. Morphological studies showed that there was a slight difference in the oesophagus: length ratio in the two strains, the feline strain having a relatively longer oesophagus. This difference became less evident with increase in total length, but was still detectable in adult specimens from various wild hosts. This may indicate the convergence of two originally distinct species. The development of the various larval stages is shown by figures and tables. The first moult was observed in the egg, the second moult in the tissues of mice and in the intestinal wall of cats, the third moult in the intestinal wall of cats, and the fourth moult in the intestinal contents of cats and dogs. Eggs appeared at 74 days after infection. It is suggested that the life-history of *T. leonina* shows an adaptation to hosts which include both scavengers and predators. The sojourn of the larvae in the intestinal wall, following ingestion of eggs, allows subsequent migration towards the intestinal lumen, if the host is suitable as a final host, but if the scavenging host is unsuitable, subsequent migration into the somatic tissues makes this host a potential intermediate host.

J. F. A. Sprent

2140—STIREWALT, M. A., 1959. [Naval Medical Research Institute, National Naval Medical Center, Bethesda, Maryland, U.S.A.] "Chronological analysis, pattern and rate of migration of cercariae of *Schistosoma mansoni* in body, ear and tail skin of mice." **Annals of Tropical Medicine and Parasitology**, 53 (4), 400–413.

Stirewalt describes the results of an investigation of the migration of cercariae of *Schistosoma mansoni* within the skin of mice. The cercariae usually remain in the skin for three or four days but occasionally adult worms were recovered after as little as eighteen hours from the time of infection. The cercariae appear to migrate along the path of least resistance with little evidence of response to trophic stimuli.
P. Knight

- 2141**—TANDON, R. S., 1958. [Department of Zoology, Lucknow University, India.] "Development and morphology of the cercaria of an amphistome, *Fischoederius elongatus* (Stiles & Goldberger, 1910), recovered from a naturally infected *Limnaea luteola* at Lucknow." *Zoologischer Anzeiger*, **161** (7/8), 200–206.

The anatomy and development of the amphistome cercaria of *Fischoederius elongatus* is described. Tandon failed to observe lymph vessels in the cercaria. B. L. James

- 2142**—TIMON-DAVID, J., 1958. "Contribution à la connaissance du cycle évolutif des Dicrocoeliidae (Trematoda, Digenea): développement expérimental de *Dicrocoelioides petiolatum* (A. Railliet)." *Comptes Rendus des Séances de l'Académie des Sciences. Paris*, **247** (25), 2497–2499.

Timon-David was able to infect 76% of *Helicella* (*Helicopsis*) *arenosa* by feeding to them eggs teased from the uterus of *Dicrocoelioides petiolatum*. There are two sporocyst generations but the earliest sporocyst stages have not yet been observed. 95 hours after the infective feed the primary sporocysts appear as cylindrical tubes filled with secondary sporocysts; in the same molluscs innumerable secondary sporocysts are visible throughout the visceral mass and in the pallial cavity. They are lemon-shaped sacs, with a prominent mucro at one end, and measure an average of 500 μ long by 450 μ in transverse diameter. The wall is double and the internal cavity is divided into two compartments by a marked constriction of the endocyst. There is no duct or birth pore and the endocyst is far tougher than the true wall. Six to eight cercariae develop in each sporocyst, the numbers being unequally divided between the two compartments. The cercariae are very active and belong to the short-tailed type of dicrocoeliid cercaria, all maturing simultaneously. The flame cell formula is 2 [(2+2+2)+(2+2+2)]. The secondary sporocysts which have attained the pallial cavity in the snail are expelled regularly, coated in mucus, and disseminated on leaves or damp soil in a fashion very similar to that previously described in *Conspicuum*. Shedding takes place by day and night but the rhythm is variable. This shedding of the secondary sporocysts indicates that a second intermediary, probably an arthropod, is essential for the life-cycle. S. Willmott

- 2143**—TIMON-DAVID, J., 1959. "Rôle des isopodes terrestres des genres *Armadillidium* et *Armadillo* dans le cycle de *Dicrocoelioides petiolatum* (A. Railliet) (Trematoda, Digenea)." *Comptes Rendus des Séances de l'Académie des Sciences. Paris*, **248** (20), 2909–2911.

Timon-David here describes the experimental completion of the life cycle of *Dicrocoelioides petiolatum* using the terrestrial isopods *Armadillidium* and *Armadillo* as second intermediate hosts [see also abstract No. 2142 above]. Earlier experiments using ants were unsuccessful. The isopods were infected by keeping them for four or five days in petri dishes, lined with damp filter paper, with several *Helicopsis* which were shedding sporocysts abundantly. In one batch 33% and in another 71% became infected and as many as 14 encysted metacercariae were found in one *Armadillidium*. In one exposed to infection for twelve hours several metacercariae were observed at the commencement of encystment; the tail is lost but the stylet is still in place at this stage. A little later the body commences to fold on itself and a thin envelope is discernible. Five days later encystment is very clear, the wall being 7 μ thick. A period of maturation within the isopod is essential before the cysts become infective. Experimental infections were established in *Passer montanus* by feeding to them infective *Armadillidium*. The whole cycle takes about nine months. S. Willmott

- 2144**—TOMIMURA, T. ET AL., 1959. [Laboratory of Veterinary Pathology, College of Agriculture, University of Osaka Prefecture, Sakai, Osaka, Japan.] [Intraperitoneal infection of rats with young adults of *Paragonimus ohirai* (Miyazaki, 1939) and its egg production in early stages of infection.] *Japanese Journal of Veterinary Science*, **21** (1), 19–32. [In Japanese: English summary pp. 30–31.]

32 immature adults of *Paragonimus ohirai* were introduced into the peritoneal cavity of 15 albino rats. The numbers of worms given to a rat were from one to four. Out of 32 worms introduced, 31 survived. Typical cysts were developed in the lungs of the rats which received two to four worms respectively, and eggs were found in the faeces 18 to 37 days after the transplantation of the worms. Most of the first worm cysts were formed by the dilatation of the bronchus, the second or third cysts by softening of the lung tissue. The worms seemed to have migrated from the former to the latter soon after their eggs appeared in the faeces. The e.p.g.

curve showed a remarkable rise from 4 to 16 days, and from 19 to 31 days after the eggs were found in the faeces to the value of 2,850 to 11,250 and 3,816 to 10,100 respectively; this seemed to indicate that the rising of the value might be connected with the migration of the worm.

Y. Yamao

- 2145**—**TRIANTAPHYLLOU, A. C. & HIRSCHMANN, H.**, 1959. "Development and sex determination in *Meloidogyne incognita* and intersexuality in *M. javanica*." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] **Phytopathology**, **49** (9), 552-553.

Triantaphyllou & Hirschmann report that in Rutgers tomato roots at 85°F., adult female *Meloidogyne incognita* had developed 15 days after larvae had invaded. The second moult occurred 11 to 13 days after invasion, the third moult a few hours later and the fourth after two to four days. In half-grown second-stage larvae females had two gonads and males one. Unfavourable conditions induced maleness and could cause sex reversal. At 65°F. male larvae gave rise to males with one testis and female larvae to males with two testes. In *M. javanica* when food was limited males were abundant: intersexes were derived from second-stage female larvae and usually had two testes.

M. T. Franklin

- 2146**—**WATSON, N. H. F. & PRICE, J. L.**, 1960. [Fisheries Research Board of Canada Biological Station, London, Ontario, Canada.] "Experimental infections of cyclopoid copepods with *Triaenophorus crassus* Forel and *T. nodulosus* (Pallas)." **Canadian Journal of Zoology**, **38** (2), 345-356.

Watson & Price successfully infected 9 out of 19 species of cyclopids with coracidia of both *Triaenophorus crassus* and *T. nodulosus*, while three species were infected with *T. crassus* only and four with *T. nodulosus*. The authors conclude that *Microcyclops varicans rubellus*, *Cyclops bicuspidatus thomasi* and *C. brevispinosus* are probably the most important hosts of *Triaenophorus* in North American lakes. Size or feeding habits of the cyclopids did not have any effect on the ingestion of coracidia. Experimental infections were heavier than natural ones.

G. A. Webster

- 2147**—**WEISER, J.**, 1960. [Lab. pathologie hmyzu, Biologický ústav akademie, Praha, Czechoslovakia.] "Nemoci ponrav chroustů v ČSR." **Věstník Československé Zoologické Společnosti**, **24** (1), 71-74. [English summary p. 73.]

1.2% of 231 *Melolontha melolontha* larvae, collected in the region of Malacky (Czechoslovakia) were found to harbour numerous larvae of *Neoapectana melolonthae* Weiser, 1959. Most larvae were in the first developmental stage. Dead females were also found. In moist chambers the larvae moulted much later than those of other *Neoapectana* species. Infected *Galleria melonella* died within 24 hours of infection. Males and females left the insect host 10 days after infection and ensheathed larvae were produced five days later. The cycle could be repeated. Examination of 50 *M. hypocausteae* and 40 *Epicometis* sp. larvae did not reveal any helminthic infection.

N. Jones

- 2148**—**WILLIAMS, J. B.**, 1959. [Department of Parasitology, London School of Hygiene and Tropical Medicine, London, W.C.1.] "Abnormal migration in *Polystoma integerrimum*." **Journal of Helminthology**, **33** (2/3), 205-206.

One of a group of *Rana temporaria* tadpoles, naturally infected with *Polystoma integerrimum* but kept under conditions precluding re-infection, was observed to have two larvae attached to the skin of the ventral surface. The tadpole was fixed and dissected; the gills showed no sign of atrophy and the bladder had not developed. One larva was found in the branchial chamber, two were in the cloacal tube, seven occupied the cloacal chamber and two had travelled up the right ureter to the kidney. The possible reasons for this are discussed.

S. Willmott

- 2149**—**WOOTTON, D. M.**, 1957. "Notes on the life-cycle of *Azygia acuminata* Goldberger, 1911 (Azygiidae—Trematoda)." **Biological Bulletin**, **113** (3), 488-498.

Wootton describes the life-history of *Azygia acuminata* from Cape Cod, Massachusetts. Cercariae were found in *Campeloma decisum*; adults occurred in *Ameirus nebulosus*, *Lepomis macrochirus* and *Esox niger* from the Santuit River and were experimentally produced in these fishes and in *Perca flavescens*. Brief descriptions of the adult, miracidium, redia and cercaria are

given. Experimental infections of snails were attempted but were not successful. Infections with larvae of *A. acuminata* were present only in female *C. decisum*, the rediae developing in the uterus, and adversely affecting the normal development of young snails. A revised key for the genus *Azygia* is presented, listing the recognized species and described cercariae.

E. I. Sillman

- 2150**—YANCHEV, Y. & BOZHKO, D., 1960. [Parazitologicheskaya laboratoriya, Zoopark Bolgarsko Akademii Nauk, Sofia, Bulgaria.] [The biology of *Proalaria excavata* Rud.] **Dokladi Akademii Nauk SSSR**, **132** (3), 726–728. [In Russian.]

Yanchev & Bozhkov fed spinal chord of *Rana ridibunda*, containing 25 to 150 metacercariae of *Tylodelphis rhachiaea*, to three white storks on two or three occasions. As a result trematode eggs were found in the faeces and 2 to 25 specimens of mature and immature *Proalaria excavata* were recovered from the small intestine 10 to 17 days after exposure. Five mature specimens of *Chaunocephalus ferox orientalis* were also found in the posterior end of the small intestine of one stork. It is concluded that metacercariae of *T. rhachiaea* are the larvae of *P. excavata* and that white storks are very susceptible to this parasite, 20% to 25% of the metacercariae developing to the adult stage in the second and third experiments. The presence of *C. ferox orientalis* was probably due either to the presence of its metacercariae in some organs of the frog which were fed to the stork (spinal cord and hind leg) or to the fact that the stork was already naturally infected.

N. Jones

- 2151**—YOKOGAWA, M. ET AL., 1959. "Studies on the route of the migration of the larvae of *Paragonimus westermani* in rats by Evans-blue technique. I. The excystation times and the distribution of the penetration sites of the excysted larvae." [Abstract.] **Journal of Parasitology**, **45**, (4, Sect. 2), 20.

Rats were fed with 20 metacercariae of *Paragonimus westermani* and groups were killed 30 minutes, one hour and three hours later, being injected intravenously with 3·4–4 c.c. per kg. of Evans blue solution 15 minutes before killing. Penetration sites were shown as blue spots in the walls of the small intestine 15 minutes after injection, but were never found in the stomach or caecum. Excysted larvae in abdominal walls were found as blue spots one hour after ingestion. Some penetration sites were not stained and appeared as haemorrhagic spots three hours after ingestion. The number of blue spots coincided with the number of larvae found in the abdominal cavity within one hour after ingestion (an average of 6·4).

N. A. Hancock

Bionomics

See also Nos. 1685, 1691, 1693, 1703, 1710, 1728, 1737, 1738, 1740, 1751, 1758, 1759, 1760, 1778, 1829, 1875, 1882, 1887, 1892, 1897, 1900, 2082, 2098, 2102, 2106, 2124, 2125, 2244.

- 2152**—BÉLANGER, L. F., 1960. [Department of Histology & Embryology, School of Medicine, University of Ottawa, Canada.] "Parasitic uptake of radiosulphate by trematodes." **Canadian Journal of Zoology**, **38** (1), 226–227.

Bélangier reports uptake and localization of radiosulphate in the hypodermis and underlying musculature of frog lung flukes (probably *Haematoloechus* or *Haplometra*) within two hours of subcutaneous injection of a female *Rana pipiens* with a dose of 1·5 microcuries of S^{35}_{04} per gm. weight in 1 ml. of weak hydrochloric acid. The nature of the sulphated substance in the trematodes is not known, as results of histochemical stains were either negative or equivocal at the level of the trematodes' autoradiographic record. A photomicrograph of a section of a trematode *in situ* illustrates the autoradiographic record.

E. I. Sillman

- 2153**—BERGMAN, B. H. H. & DUUREN, A. J. VAN, 1959. "Het bietencystenaaltje en zijn bestrijding. VI. De invloed van wortels van waardplanten en excreten hiervan op de bewegingsrichting van larven van *Heterodera schachtii* in vitro." **Mededelingen van het Instituut voor Rationele Suikerproductie. Bergen-op-Zoom**, **29** (1), 1–24. [English & French summaries pp. 18–23.]

Bergman & van Duuren were unable to show that larvae of beet eelworm were attracted to roots of host plants or their secretion products. Experiments with roots in agar showed that larvae accumulated around the root tip because the agar was softened in that region, probably by root secretions, and the larvae were trapped in the fluid medium.

H. R. Wallace

- 1254—BERGMAN, B. H. H. & DUUREN, A. J. VAN, 1959. "Het bietencystenaaltje en zijn bestrijding. VII. De werking van stofwisselingsproducten van sommige micro-organismen op de larven van *Heterodera schachtii*." *Mededelingen van het Instituut voor Rationele Suikerproductie. Bergen-op-Zoom*, 29 (2), 25–53. [English & French summaries pp. 49–52.]

Isolations of bacteria from the rhizosphere of rape-seed and sugar-beet plants grown in pots gave several species of bacteria. Suspensions of some of these bacteria attracted larvae of sugar-beet eelworm while others proved to be repellent. Bacterial strains were also isolated from the rhizosphere of host plants and from the liquid in vessels in which batches of cysts had failed to hatch. These bacteria inactivated larvae and Bergman & van Duuren emphasize that this was due to the bacterial metabolic products affecting the eelworm rather than by parasitism. The toxins are probably formed from amino-acids bound in peptide form. Five strains of bacteria which were toxic to eelworms were provisionally identified as belonging to the family Micrococcaceae, genus *Micrococcus*.
H. R. Wallace

- 2155—BLOOM, J. R. & COUCH, H. B., 1959. "Influence of soil moisture on root-knot development in tomato." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] *Phytopathology*, 49 (9), 534.

Tomatoes were grown with the split root technique in soil at two moisture levels, field capacity and permanent wilting point. Eggs of *Meloidogyne hapla* were added to each soil system and after 30 days counts of root-knots were made. The number of knots was significantly higher on roots grown in soil at field capacity. Bloom & Couch suggest that the occurrence of less disease at the higher soil moisture stress (low moisture content) is due to the inability of the larvae to migrate. They also state that eggs of *M. hapla* probably hatch equally well at either field capacity or the wilting point but there is no evidence for this in the brief description given in their paper.
H. R. Wallace

- 2156—BOKO, F. F., 1959. "Die Resultate unserer Forschungen über einige bioökologische und klimatische Faktoren, die bedeutenden Einfluss auf die Unilokular Echinokokkus-Verbreitung ausüben Können." *International Veterinary Congress (16th), Madrid*, May 21–27, 1959. Vol. II, pp. 713–715.

Boko has studied the influence of some climatic and bioecological factors on the distribution of hydatidosis. The proportion of sterile to fertile cysts was 87:13 in cattle, 6·6:93·4 in sheep and 12·3:87·7 in pigs, while the number of protoscoleces in 1 c.c. of only fertile cysts was 250, 3,480 and 3,600 respectively. This difference in fertility explains the less frequent infection of man and domestic animals in cattle-breeding areas. Scoleces outside cysts were killed by $-12\cdot5^{\circ}\text{C}$. in 47 hours and inside cysts by -14° to -16°C . in 70 hours. 15 hours at $-3\cdot5^{\circ}\text{C}$. considerably reduced their infectivity to dogs. Only a small proportion of the oncospheres was infective to young pigs after five-and-a-half days at -9° to -16°C . The cold was observed to damage their shells. These results may explain the low frequency of unilocular echinococcosis in cold northern areas.
G. I. Pozniak

- 2157—RHOADES, H. L. & LINFORD, M. B., 1959. [Department of Plant Pathology, University of Illinois, Urbana, Illinois, U.S.A.] "Molting of preadult nematodes of the genus *Paratylenchus* stimulated by root diffusates." *Science. Lancaster, Pa.*, 130 (3387), 1476–1477.

The pre-adult larvae of *Paratylenchus projectus* and *P. dianthus* survive in moist soil for long periods [time not stated but pre-adults of *P. dianthus* were recovered from a jar of moist soil that had been stored for over two years]. During this time the nematodes do not feed. When pre-adults are placed in water only 1% to 2% of *P. dianthus* and about 16% of *P. projectus* moulted to the adult stage. When the pre-adults were placed in carnation root diffusate, however, about 85% of *P. dianthus* and 100% of *P. projectus* moulted. There is imperfect agreement between suitability of plants as hosts and their production of active root diffusate. Rhoades & Linford suggest that this is the first time it has been demonstrated that root diffusates stimulate moulting of plant-parasitic nematodes.
H. R. Wallace

- 2158—CHOWDHURY, A. B., RAY, H. N. & BHADURI, N. V., 1958. "Polysaccharides in the hook-worm larvae." *Bulletin of the Calcutta School of Tropical Medicine*, 6 (2), 59.

Histochemical study of the distribution of polysaccharides in growing larvae of *Ancylostoma duodenale* and *Necator americanus* showed that the greatest accumulation of PAS-positive

material was in the subcuticular region; the longitudinal bands and adjacent muscular layer were selectively impregnated. The granules were also liberally deposited within the cytoplasm of the living cells of the intestinal lumen. The reaction was mildly positive over the nervous band encircling the oesophagus, but was negative over the outer cuticular layer. The polysaccharide content increased with the growth of the larvae to a maximum in the filariform stage. In occasional filariform larvae the polysaccharide content was, however, depleted. The PAS-positive material was chiefly glycogen; hyaluronic acid type of polysaccharide was present at nuclear sites and over the cuticular covering layer. Strong red metachromasia with toluidine blue indicated abundance of mucopolysaccharide all over the body. This reaction became more intense with the growth of larvae. [For abstract of an earlier, brief histochemical study of the hookworm larva see Helm. Abs., 25, No. 383j.] G. I. Pozniak

- 2159**—CIORDIA, H. & BIZZELL, W. E., 1960. [Regional Animal Disease Research Laboratory Substation, Agricultural Research Service, U.S. Department of Agriculture, Experiment, Georgia, U.S.A.] "Some effects of X-ray on the infective larvae of the cattle nematode *Trichostrongylus axei*." **Experimental Parasitology**, New York, 9 (1), 37-41.

In these experiments infective larvae of *Trichostrongylus axei* were exposed to irradiation from an X-ray machine operating at 250 kv., 15 ma. with a dose rate of 1,000 roentgens per minute. Doses up to 90,000 roentgens had no apparent effect on the motility of the larvae. When treated larvae were administered to five-week-old rabbits, it was found that a dose of 5,000 roentgens apparently increased infectivity, but as the dose was increased above 10,000 roentgens, infectivity was reduced until at 90,000 roentgens no worms developed. The relative number of male worms in the infections was also reduced as the dose was increased, and at 60,000 roentgens no males were seen.

F. H. S. Roberts

- 2160**—COUCH, H. B. & BLOOM, J. R., 1960. "Influence of soil moisture stresses on the development of the root knot nematode." **Phytopathology**, 50 (4), 319-321.

With a split-root technique the root systems of two tomato varieties were held at two soil moisture stresses, field capacity (FC) and permanent wilting percentage (PWP). Eggs of *Meloidogyne hapla* were added to each soil system. After 30 days root-knot counts were made. Higher counts were obtained on roots grown at FC. Roots grown at PWP for 30 days followed by FC for 30 days showed similar counts to those grown for 30 days at PWP only. It is concluded that the eggs of *M. hapla* hatch equally well at FC and PWP but that the hatched larvae are unable to migrate at the higher moisture stress.

H. R. Wallace

- 2161**—CRITES, J. L., 1958. "The chemistry of the membranes of the egg envelope of *Cruzia americana* Maplestone, 1930 (Nematoda: Kathliniidae)." **Ohio Journal of Science**, 58 (6), 343-346.

Crites used histochemical tests to examine the membranes of the egg envelope of *Cruzia americana*. The innermost or "vitelline" membrane was lipid, probably a sterol or wax. The "shell proper", secreted by the egg was chitin and the "protein coat", secreted by the uterine wall, was probably a mucoprotein containing some lipid.

W. P. Rogers

- 2162**—DOLLIVER, J. S., 1959. "Emergence of *Pratylenchus penetrans* from orchard grass roots." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] **Phytopathology**, 49 (9), 537.

Dolliver found that the rate of emergence of *Pratylenchus penetrans* from roots of *Dactylis glomerata* increased with temperature up to 24°C. Incubation of roots at 43°C. for various periods inhibited emergence in water but the effect was not permanent. Roots incubated in flooded soil at 24°C. retained five times as many nematodes as roots incubated in tap water. Dilute salt solutions also inhibited the rate of emergence of *P. penetrans*.

D. J. Hooper

- 2163**—DUSANIC, D. G., 1959. [Department of Microbiology, University of Chicago, Chicago, Illinois, U.S.A.] "Histochemical observations of alkaline phosphatase in *Schistosoma mansoni*." **Journal of Infectious Diseases**, 105 (1), 1-8.

Dusanic found that alkaline phosphatase could be demonstrated histologically in all stages of the life-cycle of *Schistosoma mansoni*. Details of the distribution of the enzyme in the tissues of the different stages of the parasite and in some of the tissues of the hosts are given. W. P. Rogers

2164—ERA, E., 1959. [Clinical Department II, Research Institute of Endemics, Nagasaki University, Nagasaki, Japan.] [Experimental studies on the periodicity of microfilariae.] **Endemic Diseases Bulletin of Nagasaki University**, 1 (3), 252–277. [In Japanese: English summary pp. 276–277.] Periodical appearance of microfilariae of *Dirofilaria immitis* and *Wuchereria bancrofti* was greatly influenced and the complete reversal of their periodicity seemed possible when the carrier worked at night and slept in the daytime. After a carrier of microfilariae of *W. bancrofti* had been kept from the sunlight for a long time, a small number of microfilariae appeared in the daytime. Being kept from the sunlight for quite a long time had less influence on the periodical appearance of the microfilariae than the complete reversal of living habit. Periodical appearance of microfilariae seemed to depend closely on the daily physiological rhythm which was determined by the living habit. Y. Yamao

2165—EUZÉBY, J. A., 1959. [Ecole vétérinaire de Lyon, France.] “Alimentation et réceptivité des animaux aux maladies parasitaires.” **Bulletin de l'Office International des Epizooties**, 52, 168–197. [English, Italian and Spanish summaries pp. 195–197.] Euzéby discusses the receptivity of animals to parasitic diseases as indirectly influenced by the quality and quantity of food. The qualitative aspect is represented by the physical and chemical qualities of food, i.e. lesions due to the coarseness of food in the first case and intestinal inflammations due to the toxins or to such factors as alterations of the intestinal pH in the second case. Under the quantitative aspect are considered deficiencies, total and elective, and overfeeding. Having all this in view, the author goes on to consider the role of alimentation as regards diagnosis, treatment and prophylaxis of parasitic diseases. N. Jones

2166—EVERARD, C. O. R. & FEDER, W. A., 1959. [Biological Laboratories, The Polytechnic, Regent Street, London, W.1.] “Effective increase in nematode populations by the addition of aureomycin.” [Correspondence.] **Nature, London**, 184 (4702), 1887–1888. Following casual observations that the addition of aureomycin to corn meal agar cultures of *Panagrellus* and *Rhabditis* resulted in an increased eelworm population, Everard & Feder carried out replicated, controlled experiments on this. Concentrations of 1: 1,000, 1: 10,000, 1: 100,000, 1: 1,000,000 and 1: 10,000,000 of aureomycin were used. Statistical analysis of the data obtained indicates that the populations at the lower concentrations are significantly greater than those on untreated dishes, the maximum increase apparently taking place at a concentration of 1: 1,000,000. The higher concentrations markedly restrict the nematode populations. S. Willmott

2167—FORSTNER, M. J., 1960. [Zoologisch-Parasitologisches Institut, München 22, Veterinärstrasse 13, West Germany.] “Parasitologische Untersuchungen an der Kläranlage Mindelheim zur Beurteilung des Wurmbefalls von Weiderindern des Abwasserverregnungsgebietes.” **Berliner und Münchener Tierärztliche Wochenschrift**, 73 (9), 161–164. [English summary p. 163.] The municipal sewage works at Mindelheim were examined for helminth eggs at different times of the day throughout a week. Various eggs were found in the untreated waste water and the fresh and decomposing sludge, but dried sludge contained only ascarid eggs incapable of further development and the mechanically cleared waste water was free of eggs. With present-day techniques, the infection of man and animals through the agricultural use of treated sludge and water is almost impossible. G. I. Pozniak

2168—GOLDEN, A. M. & SHAFER, T., 1959. [Crops Research Division, U.S. Department of Agriculture and Beet Sugar Development Foundation, Salinas, California.] “Influence of germinating seeds of sugar beet (*Beta vulgaris*) on emergence of larvae from cysts of the sugar-beet nematode (*Heterodera schachtii*).” **Plant Disease Reporter**, 43 (10), 1103–1104. Larval emergence from cysts of *Heterodera schachtii* was stimulated by a solution prepared by washing with distilled water seeds of sugar-beet which had germinated for four days. Seeds germinated for less time than this had not stimulatory effect, but seeds germinated for five days had an effect approaching that of beet diffusate. A. M. Shepherd

2169—GOLISHKINA, K. K. & ILIN, M. M., 1960. [A contribution to the epizootiology of opisthorchiasis.] [Abstract.] **Veterinariya**, 37 (4), 58. [In Russian.]

- 2170—HARTWELL, W. V., DAHLSTROM, R. V. & NEAL, A. L., 1959. "Crystallization of a natural hatching factor for larvae of the golden nematode." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] *Phytopathology*, **49** (9), 540–541.

The methods of concentration and purification of tomato root diffusate used in the preparation of the potato-root eelworm hatching factor are described. Elemental analyses of the diphenyl phosphate derivative of a crystalline preparation indicate a possible molecular formula $C_{13}H_{12}O_3$. No free carboxyl group was detected. H. R. Wallace

- 2171—HOLMES, J. C., 1959. "Competition for carbohydrate between the rat tapeworm, *Hymenolepis diminuta*, and the acanthocephalan, *Moniliformis dubius*." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 31.

Groups of rats were placed on diets with either starch, glucose or sucrose as the sole carbohydrate, and others on a "chow" diet. Some of each group had been infected with *Moniliformis dubius* five weeks previously. Two days later, half the infected and all the uninfected rats were given *Hymenolepis diminuta* cysticeroids. On autopsy four weeks later, *H. diminuta* and *M. dubius* females from the glucose diet and *M. dubius* males and females and *H. diminuta* from the "chow" diet were lighter, shorter and had lower weight/length ratios than worms from single infections. Other groups of rats were infected with both parasites, either singly or concurrently. 25 days later half of each group were given 0.2 c.c. per 100 gm. body-weight of phlorhizin 10% suspension in sesame oil as a daily subcutaneous injection for 10 days. Tapeworms from single infections in treated animals were heavier than those from controls, and identical tapeworms weights were recorded from seven out of 16 treated rats with concurrent infections. [See also Helm. Abs., **26**, No. 398bi & **27**, No. 247bc.] N. A. Hancock

- 2172—HOLMES, J. C., 1959. "Interaction between dietary carbohydrate quality and quantity in nutrition of *Hymenolepis diminuta*." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 31.

Rats were given five *Hymenolepis diminuta* and placed on *ad lib.* diets containing low (34%) or high (68%) percentages of starch, glucose or sucrose as the only carbohydrate constituent. Three weeks later, the weights of worms showed that at the high level used, glucose was a slightly better carbohydrate source than starch, whereas at the low level starch was much superior. Sucrose was fairly satisfactory at a high level, but at the low level growth was greatly reduced. [See also Helm. Abs., **26**, No. 95g.] N. A. Hancock

- 2173—ICHII, S., SUGIURA, K. & MATSUMOTO, K., 1958. [Department of Medical Zoology, Showa Medical School, Tokyo, Japan.] [Metabolic changes in *Ascaris lumbricoides* var. *suum* during culture *in vitro*. I.] *Japanese Journal of Parasitology*, **7** (6), 661–665. [In Japanese: English summary p. 665.]

100 to 130 mg. of adenosine triphosphate was found per 1 gm. of body-wall of *Ascaris lumbricoides* var. *suum*. When the worms were cultured in 0.95% saline solution at 30° to 37°C., adenosine triphosphate decreased gradually at first, then in three or four days showed a sharp decline, down to about half of the original value. Glycogen of the body wall decreased slowly, whereas that of the intestine lost two-thirds of its original amount on the first day of the culture and kept that level thereafter. Ascorbic acid was found mainly in the cavity fluid. Its decrease in the culture media paralleled the changes of intestinal glycogen. Y. Yamao

- 2174—JENNINGS, J. B., 1959. [Department of Zoology, University of Leeds, U.K.] "Studies on digestion in the monogenetic trematode *Polystoma integerrimum*." *Journal of Helminthology*, **33** (2/3), 197–204.

Jennings describes the structure of the gut of *Polystoma integerrimum* which feeds on blood. This is digested by a combination of intraluminal and intracellular processes. The intraluminal digestion appears to be an incidental extension of the intracellular process, enzymes being released simultaneously with the expulsion of haematin from the cells of the gastrodermis. The end products of intracellular digestion are haematin and haematoidin, a crystalline substance chemically identical with vertebrate bilirubin. An exactly parallel digestive process has been described in the lamellibranch *Lasaea rubra*. The processes are compared with those described in other blood-feeding parasites and it is shown that an alternative method must exist as such trematodes as *Haplometra* and *Gorgodera* do not form haematin. S. Willmott

- 2175—JONES, F. G. W., 1959. [Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, U.K.] "Ecological relationships of nematodes." In: Holton, C. S. et al. [Editors]. "Plant pathology: problems and progress 1908-1958". **Madison: University of Wisconsin Press**, pp. 395-411.

Jones deals with the general ecological relationships of nematodes and with the soil and plant phases in the life-cycles of plant-feeding and plant-parasitic forms. Nematodes occur in most habitats but are everywhere dependent on water. They are thought to have arisen in the sea which presents a favourable and stable environment. Land environments are less favourable and often require an ability to withstand periods of desiccation at some stage of development. Cultivated land is a specialized, artificial environment subject to greater climatic extremes and frequent change according to the whims of the cultivator. The factors affecting the soil phase in nematode life-cycles are temperature, structure, moisture and aeration. pH and the chemical properties of soil exert little influence. Soil moisture and aeration are interrelated with structure. Attempts to correlate nematode distribution and abundance with soil type in a general way usually fail because of the many factors involved. In study the influence of the soil environment on egg hatch and movement, processes which lead up to nematode attacks on plants, the pH scale and the moisture characteristic have been most useful in disentangling the effects of different, individual factors. Roots modify the soil environment. Substances exuded by roots influence nematodes directly as egg hatching factors and possibly as attractants and indirectly through the complex of organisms that develop in the rhizosphere. Nematodes belong to the higher cycles of decay and mineralization of soil organic matter in soil but are relatively important in the economy of the soil. Soil populations of plant-feeding and saprobic nematodes are conditioned by the plants grown. In agricultural land, populations of plant feeders and plant parasites are largely determined by the last host crop grown. Populations of cyst-forming nematodes (*Heterodera* spp.) behave in a fairly predictable way but those of *Ditylenchus dipsaci* do not. Little is known of the mechanism of population balance. Decline in *Heterodera* spp. in the encysted egg stage, which is largely cut off from the external environment, appears to be independent of population density. Increase, however, is limited by intraspecific competition for root space and is therefore dependent on density. A number of nematode enemies have been described (fungi, amoebae, micro-arthropods) but their influence on populations has in no case been properly assessed. Internal parasites live in an environment largely determined by the plant. The inter-relationship between nematode and plant has been little studied. Host-parasite relationships are often finely balanced and may be upset by a single gene change in the host. The cultivation of resistant plants or the mere change in variety, species or genus results in selection of the soil population in the direction of greater reproductive efficiency on the new host. In arable land selection processes must be diverse and frequently changing.

F. G. W. Jones

- 2176—KATAMINE, D. & ERA, E., 1959. [Clinical Department II, Research Institute of Endemics, Nagasaki University, Nagasaki, Japan.] [Review of the literature concerning the microfilarial periodicity.] **Endemic Diseases Bulletin of Nagasaki University**, 1 (3), 242-251. [In Japanese: English summary p. 251.]

Katamine & Era review 114 papers, published in Japan and abroad, on microfilarial periodicity.

Y. Yamao

- 2177—KAWAMURA, T. & HIRANO, K., 1958. [Faculty of Horticulture, Chiba University, Matsudo, Chiba Prefecture, Japan.] [The conditions for hatching of the eggs of the root-knot nematode.] **Annals of the Phytopathological Society of Japan**, 23 (2), 90-96. [In Japanese: English summary pp. 95-96.]

Kawamura & Hirano found that hatching of larvae of *Meloidogyne incognita* var. *acrita* was delayed by exposing the egg masses to low temperatures such as -6°C . for 20 days or -10°C . for five days, and of *M. hapla* by -10°C . for 20 days. Hatching of both species was hindered by exposure to high temperatures such as 42.5°C . for 20 minutes or 45°C . for five minutes. 70 plus or minus 2% air humidity for two hours or 60 plus or minus 1% for one hour inhibited hatching. Exposure to direct sunlight for four hours caused complete inhibition of hatching. Ultra-violet rays did not inhibit hatching with five hours' exposure. Within the limits of experiments performed, hydrogen-ion concentration had the least effect upon the hatching of

both species. The hatching process of eggs showed specific type when the eggs were exposed to desiccation and direct sunlight. The hatching process was normal for other conditions tested, except ultra-violet irradiation which was intermediate. M. Ichinohe

- 2178—KIRKPATRICK, J. D., MAI, W. F., FISHER, E. G. & PARKER, K. G., 1959. "Population levels of *Pratylenchus penetrans* and *Xiphinema americanum* in relation to potassium fertilization of Montmorency sour cherries on Mazzard root stock." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] *Phytopathology*, **49** (9), 543.

In factorial experiments involving four levels of potash, three of nitrogenous fertilizer and two of phosphate at three sites in New York State, Kirkpatrick *et al.* found that numbers of *Xiphinema americanum* and *Pratylenchus penetrans* were significantly lower in the root zone of cherry trees receiving the higher rates of potash, but were not affected by the other fertilizers. Root growth was not significantly affected by potash but increased above-ground vigour was associated with high potash levels and low numbers of nematodes. R. D. Winslow

- 2179—KIRKPATRICK, J. D., MAI, W. F., FISHER, E. G. & PARKER, K. G., 1959. "Relation of nematode populations to nutrition of sour cherries." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] *Phytopathology*, **49** (9), 543.

Chemical analysis of leaf and soil samples and soil nematode counts in 28 cherry orchards showed that numbers of *Xiphinema americanum* and *Pratylenchus* spp. were correlated positively with leaf potassium and negatively with leaf nitrogen. No statistical relationship was found between numbers of any stylet-bearing nematode and soil analysis. R. D. Winslow

- 2180—KOJIMA, T., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [Biological studies on *Rhabditis* spp. I.] *Acta Scholae Medicinalis in Gifu*, **7** (2), 638–656. [In Japanese: English summary p. 638.]

The resistance of four species of *Rhabditis* to various ovicidal agents was investigated. In general, a larva showed a stronger resistance than an adult and no difference was found between male and female. Amongst the four species, *Rhabditis pellio* was most resistant, followed by *R. elongata*, *R. longicaudata* and *R. inermis*. Y. Yamao

- 2181—KRUIDENIER, F. J. & KATOH, A. K., 1959. [University of Illinois, Urbana, Illinois, U.S.A.] "Electrophoretic studies of the sera of white rats and cats following infection with *Paragonimus kellicotti* Ward, 1908." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 17.

Rats and cats were infected with *Paragonimus kellicotti* and blood was drawn by cardiac puncture periodically. The sera were fractionated by paper electrophoresis using borate, phosphate, and veronal buffer solutions. A distinct increase in beta-gamma fractions accompanied infection in both hosts, and is considered by Kruidenier & Katoh to be due to an increase in gamma-globulin component. Little or no change occurred in albumin and alpha-globulin fractions. N. A. Hancock

- 2182—KUNII, Y., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [Studies on *Strongyloides ratti*. II. On the resistance of the larvae against various chemicals.] *Acta Scholae Medicinalis in Gifu*, **7** (1), 141–158. [In Japanese: English summary p. 141.]

Using the filter paper culture method, Kunii compared the three-day filariform larvae with six-day larvae of the same type. The latter were somewhat larger and had a larger oesophagus. There was no difference between them in respect of resistance to chemical reagents. Y. Yamao

- 2183—LEE, R. P., ARMOUR, J. & ROSS, J. G., 1960. [Animal Production Division, Federal Department of Veterinary Research, Vom, Nigeria.] "The seasonal variations of strongyle infestations in Nigerian zebu cattle." *British Veterinary Journal*, **116** (1), 34–46.

An investigation into the seasonal availability of the infective larvae of *Haemonchus contortus*, *Trichostrongylus axei*, *T. colubriformis*, *Cooperia punctata*, *C. pectinata*, *Oesophagostomum radiatum* and *Bunostomum phlebotomum* for cattle in Northern Nigeria is described. From May to September, when rainfall exceeded 6 in. per month, associated with monthly mean maximum

temperatures of up to about 90°F., significant burdens were acquired of all the above except *Trichostrongylus* spp. Lee *et al.* suggest that the high mean maximum temperature during the rains was unfavourable to the extra-host stages of *Trichostrongylus* spp. Negligible infections were acquired during the dry season and animals infected during one rainy season can carry infective material over to the next rains. An attempt is made to relate temperature and rainfall requirements of the above species to the likelihood of outbreaks of helminthiasis occurring in the climatic area of Nigeria north of 9° latitude.

D. F. Mettrick

2184—LEWIS, F. J. VON M. & MAI, W. F., 1960. [Department of Plant Pathology, New York State College of Agriculture, Cornell University, Ithaca, New York, U.S.A.] "Survival of encysted and free larvae of the golden nematode in relation to temperature and relative humidity." *Proceedings of the Helminthological Society of Washington*, 27 (1), 80–85.

Survival of cysts of *Heterodera rostochiensis* was evaluated in sulphuric acid moist chambers held in constant temperature cabinets, and in soil. The viability of encysted larvae declined rapidly at relative humidities of 88% and under 2%, after exposure to these conditions for several weeks. Higher temperatures, i.e. 86°F. and 75°F. gave more rapid decrease of survival than 59°F., 54°F. or 40°F. respectively. Free larvae did not survive prolonged exposure to relative humidities of over 80%, 20% and 3% at either 75°F. or 40°F. Survival of encysted larvae in dry, moist and flooded soils showed rapid regression with increase in soil moisture. Although some cysts were viable after flooding for a period of eight months, the number of survivals was greatest in air-dry soil.

H. Jacks

2185—LOEWENBERG, J. R., SULLIVAN, T. & SCHUSTER, M. L., 1960. [Plant Pathology Department, University of Nebraska, Lincoln, Nebraska, U.S.A.] "The effect of pH and minerals on the hatching and survival of *Meloidogyne incognita incognita* larvae." *Phytopathology*, 50 (3), 215–217.

Six mineral solutions and water, all with pH adjusted to 4.3 to 4.5, were tested as hatching media for surface sterilized eggs of *Meloidogyne incognita*. Heller's solution proved best for hatching and survival up to two weeks. When the pH of all media was adjusted to 5.7 the results were less pronounced. Tests with Heller's solution between pH 5.0 and pH 8.0 gave an optimum about 6.5. If any one component was omitted from the solution hatching was reduced. No consistent differences were noted in Heller's solutions of from one to sixfold concentrations. The solution became toxic above sixfold, and diluted solutions had reduced effectiveness. It is apparent that proper balance of ions rather than amount of ions present is the important factor.

M. T. Franklin

2186—LOWNSBERY, B. F. & VIGLIERCHIO, D. R., 1960. [Department of Plant Nematology, University of California, Davis, California, U.S.A.] "Mechanism of accumulation of *Meloidogyne incognita acrita* around tomato seedlings." *Phytopathology*, 50 (2), 178–179.

Larvae of *Meloidogyne incognita* var. *acrita* accumulate around germinating tomato seeds in response to a dialysable agent from the germinating seed. The attractant is effective at a distance from the seed surface.

H. R. Wallace

2187—LUCKER, J. T. & DOUVRES, F. W., 1960. [Animal Disease and Parasite Research Division, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland, U.S.A.] "Survival of *Taenia saginata* eggs on stored hay." *Proceedings of the Helminthological Society of Washington*, 27 (1), 110–111.

Lucker & Douvres investigated the viability of *Taenia saginata* eggs stored in lucerne. A few eggs were viable after 22 days' storage with an outdoor temperature range of 34° to 87°F.; none were viable after 71 days with a temperature range of 11° to 87°F. Desiccation, primarily loss of surface moisture, was probably the most important factor in loss of viability.

G. A. Webster

2188—MARZULLO, F., SQUADRINI, F. & TAPARELLI, F., 1957. [Clinica delle Malattie Infettive e Tropicali, Università di Modena, Italy.] "Studio istochimico sui parassiti patogeni per l'uomo. 1. *Ankylostoma duodenale* e *Oxyuris vermicularis*." *Bollettino della Società Medico-Chirurgica di Modena*, 57 (2), 84–88.

Marzullo *et al.* did not detect the presence of alkaline phosphatase in any part of *Enterobius vermicularis* or *Ancylostoma duodenale*. Acid phosphatase was found in the oesophagus and

especially in the testes, seminal vesicles and ejaculatory duct of *E. vermicularis*. Traces of it were also found in the cloaca and the anus. In *A. duodenale* this phosphatase was found in the testes and immediately under the external cuticle. Lipase was found in the ovary, testes, eggs at an advanced stage of maturation and in the oesophageal bulbs of *E. vermicularis*. Polysaccharides and glycogen were found in both parasites in the whole digestive tract. Acid polysaccharides were found in all organs of the parasites. N. Jones

- 2189—MARZULLO, F., SQUADRINI, F. & TAPARELLI, F., 1957. [Clinica delle Malattie Infettive e Tropicale, Università di Modena, Italy.] "Studio istochimico sui parassiti patogeni per l'uomo. Nota II. *Hymenolepis nana*, *Taenia saginata*, *Taenia echinococcus*." **Bollettino della Società Medico-Chirurgica di Modena**, 57 (4), 327-331.

Histochemical studies were carried out on the eggs of *Hymenolepis nana*, on the scoleces and mature proglottides of *Taenia saginata* and on the cysts of *Echinococcus granulosus*. No glycogen, muco-polysaccharides or alkaline phosphatase was found in the eggs of *H. nana*. Some acid phosphatase was found directly under the envelope. Glycogen and complex muco-polysaccharides were found in the scoleces of *T. saginata*. Glycogen was also found in the mature proglottides of this parasite as well as acid and alkaline phosphatases and lipids. Muco-polysaccharides, glycogen and alkaline phosphatase were found in the cysts of *E. granulosus*. The results of studies of *T. saginata* proglottides were the same, when carried out before and after atebirin treatment. N. Jones

- 2190—MARZULLO, F., SQUADRINI, F. & TAPARELLI, F., 1957. [Clinica delle Malattie Infettive e Tropicali, Università di Modena, Italy.] "Studio istochimico sui parassiti patogeni per l'uomo. III. Uova di *Fasciola hepatica* e *Dicrocoelium dendriticum*." **Bollettino della Società Medico-Chirurgica di Modena**, 57 (5), 501-505.

Histochemical studies were made of eggs of *Fasciola hepatica* and *Dicrocoelium dendriticum* in order to assess the presence of glycogen, muco-polysaccharides and acid and alkaline phosphatases. The eggs of *F. hepatica* were obtained by duodenal probing in the case of an infected person; those of *D. dendriticum* were recovered from the bile in the gall-bladder of slaughtered animals. The failure to find glycogen and muco-polysaccharides in the eggs is explained by the possibility of the formation of complex substances due to the unfavourable environment of the eggs. As for the phosphatases, the negative results are attributed to the quantity of these enzymes being very small. N. Jones

- 2191—MITROKHIN, V. U., 1959. [The effect of X-rays on the viability of metacercariae of *Opisthorchis*.] **Trudi Moskovskoi Veterinarnoi Akademii**, 25, 227-236. [In Russian: English summary p. 236.]

The percentage of dead *Opisthorchis* metacercariae in 5 gm. samples of fish meat rose with the irradiation dose and following time lapse. The lowest effective dose was 9,600 roentgens, producing the first dead larvae after five days and reaching a maximum of 20% dead on the 10th day. With high doses of 21,600 to 30,000 roentgens, a mortality rate of 10% to 20% on the first day rose to 25% to 35% by the third day and reached a maximum of 35% to 41% on the seventh to tenth day. Metacercariae irradiated with 24,000 to 30,000 roentgens were incapable of infecting experimental foxes. In infections achieved with larvae from lower irradiation rates, the growing *Opisthorchis* were considerably smaller than in controls and their egg productivity was greatly reduced. G. I. Pozniak

- 2192—MORISHITA, K., NISHIMURA, T. & IMAMURA, H., 1959. [Department of Parasitology, Research Institute for Microbial Diseases, Osaka University, Osaka, Japan.] [Observations on the steric distribution of *Ascaris* eggs in a rural village.] **Japanese Journal of Parasitology**, 8 (4), 532-541. [In Japanese: English summary p. 541.]

Dynamic and spatial distributions of *Ascaris* eggs were investigated in a rural district around Osaka, following the presumed passage of the eggs. The eggs were found in all the investigated places, although no definite correlation was found between those places and the numbers of the eggs. It was confirmed that the wind carried the eggs. Y. Yamao

- 2193**—MUELLER, J. F., 1959. [State University of New York, Upstate Medical Center, Syracuse, N.Y., U.S.A.] "Physiologic studies on the larval and adult scolex of *Spirometra mansonoides*." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 30–31.

Mueller states that larval scoleces are better than adult scoleces of *Spirometra mansonoides* at withstanding storage in media and repeated stomach passage. Cats were fed spargana and the intestinal mucosa searched for scoleces after one to seven days. The scoleces were cultured for several days and at intervals were injected subcutaneously into mice. Up to the fourth day the scolex reverted to the sparganum in the mouse but, after this, normal growth and segmentation occurred. It was not found possible to induce differentiation *in vitro* of the larval scolex to the adult.

N. A. Hancock

- 2194**—MUKHERJEA, A. K. & RAY, H. N., 1958. "On the occurrence of polar body in the eggs of *Ascaris lumbricoides* as revealed by the M.R. stain." **Bulletin of the Calcutta School of Tropical Medicine**, **6** (2), 66–67.

Cytochemical study revealed the presence of a polar body in the fertilized eggs of *Ascaris lumbricoides* which was absent in unfertilized eggs. It was rich in chromatin, contained a protein rich in tyrosine, a lipid and some basophilic substances. Although the DNA and RNA character of these substances could not be finally proved, the appearance of a bluish-green colour in the body after M.R. staining [method of Mukherjea & Ray described in 1957 in *Bull. Calcutta Sch. trop. Med.*, **5**, p. 176] of the pyridine extracted eggs, strongly suggests the presence of one or both these acids.

G. I. Pozniak

- 2195**—NEAL, A. L., 1959. "The influence of vitamin B₆ on the emergence of golden nematode larvae." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] **Phytopathology**, **49** (9), 547.

Pre-treatment of cysts of potato-root eelworm with vitamin B₆ increased the subsequent emergence rate of larvae in root diffusate. Addition of vitamin B₆ to root diffusate containing cysts of this eelworm also produced an increased emergence rate.

H. R. Wallace

- 2196**—PHIFER, K., 1959. "The uptake of glucose by *Hymenolepis diminuta*." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 28.

[The full account of this work appears in **J. Parasit.**, **46** (1), 51–62.]

- 2197**—PRAMER, D. & STOLL, N. R., 1959. [Department of Agricultural Microbiology, Rutgers University, New Brunswick, New Jersey, U.S.A.] "Nemin: a morphogenic substance causing trap formation by predacious fungi." **Science. Lancaster, Pa.**, **129** (3354), 966–967.

A substance, nemin, associated with *Neoeplectana glaseri* cultured axenically, caused *Arthrobotrys conoides* to form nematode-trapping hyphal loops in the absence of the nematode. Nemin was not produced when nematodes were growing rapidly and multiplying in the medium but appeared when the nematodes were dying and breaking down. The identity of nemin has not been established.

J. B. Goodey

- 2198**—PRESCOTT, D. M. & VOGEL, M., 1959. [Departments of Anatomy and Infectious Diseases, School of Medicine, University of California, Los Angeles, California, U.S.A.] "Autoradiographic study of the synthesis of ribonucleic acid in cysticeroids of *Hymenolepis diminuta*." **Journal of Parasitology**, **45** (6), 587–590.

Prescott & Vogel incubated cysticeroids of *Hymenolepis diminuta* in saline containing C¹⁴ labelled adenine. The C¹⁴, examined by autoradiography, showed greatest concentration in the body-tail junction and in the peripheral layer of the cysticeroid. The view that these results indicated the sites of most active synthesis of ribonucleic acid was confirmed by the finding that all the C¹⁴ could be removed from sections with ribonuclease.

W. P. Rogers

- 2199**—READ, C. P., SIMMONS, J. E. & ROTHMAN, A. H., 1959. "Kinetics of amino acid penetration in tapeworms." [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 27–28.

[The full account of this work appears in **J. Parasit.**, **46** (1), 33–41.]

- 2200**—REID, W. M., 1960. [Poultry Department, Poultry Disease Research Center, University of Georgia, Athens, Georgia, U.S.A.] "Effects of temperature on the development of the eggs of *Ascaridia galli*." **Journal of Parasitology**, **46** (1), 63-67.

Reid kept eggs of *Ascaridia galli* at temperatures ranging from 64°F. to 99°F. to determine the influence of temperature on development. It was found that 93°F. is the maximum temperature permitting development, and 66°F. the minimum temperature. The minimum time for development to the infective stage (as shown by infection experiments) was five days at 93°F. By recording the temperature of the litter in the brooder house throughout the year, it was found that due to body heat from the bird, optimal temperatures for egg development prevail in the litter.

J. F. A. Sprent

- 2201**—RIEK, R. F. & KEITH, R. K., 1960. [Division of Animal Health, C.S.I.R.O., Veterinary Parasitology Laboratory, Yeerongpilly, Queensland, Australia.] "Effect of X-rays on the development of the infective larvae of *Oesophagostomum radiatum* (Rud. 1803) (Strongylidae: Nematoda)." [Correspondence.] **Nature, London**, **186** (4729), 981-982.

Post-mortem examination of calves infected with *Oesophagostomum radiatum* larvae exposed to 20,000 roentgens of X-irradiation which was given in a single dose at 1,000 roentgens per minute, revealed the presence of a predominantly adult female population. Eggs in the faeces of these calves appeared to be infertile and could be detected only by sedimentation. They did not develop in faecal cultures. The main effect of this level of radiation was to prevent the establishment of an adult male population in normal numbers.

R. F. Riek

- 2202**—ROHDE, R. A. & JENKINS, W. R., 1958. "Basis for resistance of *Asparagus officinalis* var. *altilis* L. to the stubby-root nematode *Trichodorus christiei* Allen 1957." **Bulletin of the Maryland Agricultural Experiment Station**, No. A-97, 19 pp.

The authors isolated a compound from diffusate produced by the roots of *Asparagus officinalis* var. *altilis* which was nematocidal to *Trichodorus christiei*. It was shown that the compound came from the roots and that it was mostly localized in storage roots. Analysis showed that the compound had many of the properties of carbohydrates and a molecular weight in the range of the monosaccharides. Carbon, hydrogen and oxygen were present and there were alcohol and ether linkages. It was concluded that the toxic compound was a glycoside with a low molecular weight aglycone. It was also active against several other plant-parasitic nematodes in water solutions, but showed no fungicidal or bactericidal activity. Solutions of the compound decreased *T. christiei* populations on tomato when drenched into the soil or sprayed directly on tomato leaves.

A. M. Shepherd

- 2203**—ROHRBACHER, Jr., G. H., 1960. [Regional Animal Disease Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Auburn, Alabama, U.S.A.] "The effect of green feed and ascorbic acid upon single experimental infections of *Trichostrongylus axei* (Cobbold, 1879) in the laboratory rabbit." **American Journal of Veterinary Research**, **21** (80), 138-143.

The effect of the host's diet on the establishment and growth of *Trichostrongylus axei* was studied in California white rabbits. Diets tested were: Kudzu, Johnson grass, tall fescue, commercial food pellets, food pellets plus fresh lucerne and food pellets plus ascorbic acid. Single doses of 6,000 larvae were given to each rabbit in the test groups but, despite wide differences in the percentage of digestible protein in the different diets, no significant differences were found in the number of worms recovered at necropsy 17 to 30 days later. Uninfected controls gained weight faster than did infected animals except that both groups lost weight on Johnson grass and on fescue. Except for rabbits on fescue, the proportion of immature worms was significantly higher in animals on green feed than in those on pellets, suggesting that green feed inhibited larval development. Addition of fresh lucerne or ascorbic acid to the standard diet suppressed this inhibition in non-pregnant rabbits, but not in pregnant ones. The present results conflict with Gibson's work on *T. axei* in sheep [for abstracts see Helm. Abs., **23**, Nos. 268a and 427a] and Rohrbacher advances two possible explanations for this.

P. C. Bull

- 2204**—ROTHMAN, A. H., 1959. [Department of Pathobiology, School of Hygiene & Public Health, Johns Hopkins University, Baltimore, Maryland, U.S.A.] "The role of bile salts in the biology of tapeworms. II. Further observations on the effects of bile salts on metabolism." *Journal of Parasitology*, **45** (4), 379–383.

Rothman records results of experiments (employing methods he described in 1958) on anaerobic fermentation in tapeworms, fermentation in the presence of glucose and the inhibition induced by the addition of bile salt, sodium taurocholate, at pH 7 and pH 7.4 and at three concentrations. He compares the responses of adult *Hymenolepis diminuta* from rats and from hamsters, *H. citelli* from rats, *Taenia taeniaeformis* and larval *T. crassiceps* from the peritoneum of mice. These worms show differing responses and, as already recorded for *H. diminuta* from rats and *Oochoristita symmetrica* from mice, glucose fermentation in *H. diminuta* from hamsters is inhibited by bile salt but is unaffected in *H. citelli*, *T. taeniaeformis* and larval *T. crassiceps*. In *Hymenolepis diminuta* from rats, galactose is metabolised at a lower rate than glucose and its fermentation is unaffected by bile salt, thus indicating a separate permeation system. Under specified conditions, whole bile from the cotton-tail, *Sylvilagus*, inhibits glucose fermentation in *H. diminuta*. Rothman suggests that these different responses to bile salts may be one of the many factors involved in determining host specificity. There are six tables and five references. J. Mahon

- 2205**—SHIKHOBALOVA, 1958. [Gelmintologicheskaya Laboratoriya, Akademiya Nauk, U.S.S.R.] "Radioactive radiations for sterilization of meat products infested with larval forms of helminths." *Bulletin de l'Office International des Épidémiologies*, **49** bis (11/12), 643–646.

This is an account of work by Shikhobalova, Karmanova & Shehtman on the effect of X-irradiation and of Cobalt-60 gamma-irradiation on the larvae of *Trichinella*. Trichinous meat, after being irradiated with 1,000–30,000 roentgens, was fed to white mice. Irradiation with 1,000–2,000 roentgens resulted in a threefold to fivefold reduction in the number of adults compared with the controls, whereas a dose of 7,000 roentgens resulted as a rule in complete non-emergence of adults. Females were found to be more resistant to ionizing radiation than males, but their development, size and reproductive function were affected. As a result of exposure to 5,000 roentgens no late embryos were found in the females (on the eighth day after infection of mice). Thus this last-mentioned dosage also resulted in a very low number of trichinae in the muscles of mice, while mice that received greater doses had almost no trichinae in their muscles. Analogous results were obtained with exposure to rays of Cobalt-60. N. Jones

- 2206**—SINDERMANN, C. J. & FARRIN, A. E., 1959. "Ecological studies of *Cryptocotyle lingua* (Trematoda: Heterophyidae) whose larvae cause 'pigment spots' of marine fish." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 21–22.

Littorina littorea were found to be most abundantly infected with *Cryptocotyle lingua* cercariae in the high-tide zone, and much less so in the mid- and low-tide zones. The highest percentage of infected snails occurred in the winter, but mature infections were most numerous from May to November. The peak of cercarial emergence was in late summer at maximum sea temperature, coinciding with in-shore fish movement. N. A. Hancock

- 2207**—SINGH, K. S. & LEWERT, R. M., 1959. [Department of Microbiology, University of Chicago, Chicago 37, Illinois, U.S.A.] "Observations on the formation and chemical nature of metacercarial cysts of *Notocotylus urbanensis*." *Journal of Infectious Diseases*, **104** (2), 138–141.

The metacercarial cyst of *Notocotylus urbanensis* is produced by two types of secretion. The first is minutely granular, taking up water rapidly, and forming an easily disrupted, elastic, mucoid sheath which persists for only a few days. Following the formation of the mucoid envelope, rod-shaped granules of cystogenous material are extruded and the rotating body of the cercaria works them to form four concentric layers which became denser and more fibrous centripetally. The results of various histochemical tests are described. The second layer is extremely resistant to physical and chemical alteration; all parts of it are probably muco- and/or glycoprotein and lack acid mucopolysaccharides. S. Willmott

- 2208—STIREWALT, M. A., 1959. [National Naval Medical Center, Bethesda, Maryland, U.S.A.] "Comparative glandular equipment of the human schistosomes." [Abstract.] **Journal of Parasitology**, 45 (4, Sect. 2), 16.

A comparative histological assessment of the glandular equipment of human schistosomes was made and glandular secretion subjected to chromatographic analysis. 14 of the simpler amino-acids were identified in the hydrolysate. The role of secretions from pre- and post-acetabular glands influencing entrance and migration of cercariae in skin will be considered.

N. A. Hancock

- 2209—TAYLOR, A. & WHITLOCK, J. H., 1960. [New York State Veterinary College, Cornell University, Ithaca, New York, U.S.A.] "Further notes on the exsheathing mechanisms of third-stage larvae of *Haemonchus contortus*." **American Journal of Veterinary Research**, 21 (81), 318.

Taylor & Whitlock refer to their earlier work on the exsheathment of third-stage larvae of *Haemonchus contortus* in which they concluded that the natural conditions inducing exsheathment were likely to be simple and non-specific [for abstract see Helm. Abs., 29, No. 945]. They now report that high rates of exsheathment can be obtained by placing the larvae in 0.5% sodium chloride solution, saturated with carbon dioxide and maintained at 37°C. Other salt solutions (potassium chloride, sodium bromide and sodium bicarbonate) are said to be effective but no exsheathment occurred in distilled water saturated with carbon dioxide.

H. D. Crofton

- 2210—THOMASON, I. J., 1959. "Influence of soil texture on development of the stubby-root nematode." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] **Phytopathology**, 49 (9), 552.

Field populations as high as 300 to 500 stubby-root nematodes, *Trichodorus christei*, per pint of soil were found in association with sweet corn and okra on light soils in Southern California. Severe injury to the crops was observed. In pot tests, using Sudan grass as host the different effects on *Trichodorus* populations of silty clay, loam and sandy loam were studied. Samples taken at 12 and 19 weeks after planting indicated that sandy loam induced the largest and more rapid population increase. However, after the first sampling the population declined, whereas that in loam continued to increase. Four months' fallow at 30°C. at the end of the experiment resulted in a 7% survival of *Trichodorus* in loam but no survival in the other soils. A similar fallow period at 17°C. resulted in 16% survival in clay loam, 60% in loam and no survival in sandy loam. The surviving *Trichodorus* were adult females.

C. C. Doncaster

- 2211—TIMMS, A. R., & BUEDING, E., 1959. "Studies of a proteolytic enzyme from *Schistosoma mansoni*." **British Journal of Pharmacology and Chemotherapy**, 14 (1), 68-73.

Timms & Beuding found that free amino-acids of the type and proportion present in globin were more effective in prolonging the survival of *Schistosoma mansoni* in vitro than globin, or other mixtures of amino-acids. The presence in these parasites of a proteolytic enzyme with a high specificity toward haemoglobin is therefore significant. Details of the purification and properties of the enzyme are given.

W. P. Rogers

- 2212—VOGE, M., 1959. [University of California, Los Angeles, California, U.S.A.] "Temperature stress and development of *Hymenolepis diminuta* in *Tribolium confusum* on different diets." [Abstract.] **Journal of Parasitology**, 45 (4, Sect. 2), 27.

[The full account of this work appears in **J. Parasit.**, 45, 591-596. For abstract see Helm. Abs. No. 1515.]

- 2213—VON BRAND, T., 1959. [Laboratory of Parasitic Diseases, National Institute of Allergy and Infectious Diseases, Bethesda 14, Maryland, U.S.A.] "Neuere Untersuchungen aus dem Gebiet der Parasitenphysiologie." **Zeitschrift für Tropenmedizin und Parasitologie**, 10 (2), 123-134.

Von Brand reviews recent work on the physiology of parasites. He also discusses the factors that have influenced the development of work in this field and the way the problems are approached. The value of work in which an over-all view of metabolism is sought is discussed in relation to studies in which one particular enzyme or group of enzymes is examined in detail.

W. P. Rogers

- 2214**—VON BRAND, T., 1959. [Laboratory of Parasitic Diseases, National Institute of Allergy and Infectious Diseases, Bethesda 14, Maryland, U.S.A.] "Neuere Untersuchungen aus dem Gebiete der pathologischen Physiologie parasitischer Infektionen." *Zeitschrift für Tropenmedizin und Parasitologie*, **10** (2), 135–146.

Most of this review deals with physiological aspects of pathology of infections with protozoa though occasional references are made to helminths. The discussion on host-parasite relationships and features of the physiology of parasites which have unfavourable effects on the host, though it is most detailed as it concerns trypanosomes, has a general interest and application.

W. P. Rogers

- 2215**—VORA, D. D., 1958. [Municipal General Hospital, Sion Road, Sion, Bombay-22, India.] "An experimental study of anthelmintic action of oxygen against *Ascaris lumbricoides*, by exposure to different concentrations of oxygen for variable lengths of time." *Indian Journal of Medical Sciences*, **12** (8), 609–617.

Adult *Ascaris lumbricoides*, obtained from infected patients, were exposed to various concentrations of oxygen (made up with nitrogen as the inert gas) varying from 0 to 100% for periods of three hours or less. The apparatus and experimental procedure are described and were chosen to simulate the conditions of gastric therapy *in vivo*. Death of worms was judged by the absence of motility during a 20-minute observation period in glucose saline immediately after the test (for "immediate mortality") and again after the worms had remained in glucose saline for 19 hours (for "late mortality"). The anthelmintic action of oxygen increased with increasing concentration and time of exposure; it starts in a 40% concentration after three hours' exposure, giving 25% immediate and 56% late mortality. All worms are dead after three hours in 70% oxygen and 20 minutes in pure oxygen. The results show that oxygen paralyses the metabolism of the worms in such a way that when the worms do not die immediately, the derangement is sufficient to result in later death.

G. I. Pozniak

- 2216**—WAGNER, A., 1959. "Stimulation of *Schistosomatium douthitti* cercariae to penetrate their host." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 16.

Wagner found that cercariae of *Schistosomatium douthitti* were stimulated to penetrate ears of white mice, even when the ears had been stored for up to 47 days in a cold moist chamber. If, however, the ears were extracted with ether, stimulation was much reduced. The residue from extraction stimulated cercariae to go through the cycle of action of penetration and, when rubbed on to extracted ears, renewed stimulation. Free fatty acids, including valeric acid, produced similar reactions.

N. A. Hancock

- 2217**—WEINMAN, C. J. & HUNTER, III, G. W., 1959. [Department of Microbiology, College of Medicine, University of Florida, Florida, U.S.A.] "Studies on schistosomiasis. XIV. Effects of cortisone upon the *Schistosoma mansoni* burden in mice." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 16–17.

Male mice (CFW strain) were given 0.5 mg. doses of cortisone acetate Merck at different times with varying totals in relation to initial infection with *Schistosoma mansoni* and controls were injected with physiological saline. All groups of mice treated with cortisone showed a small but statistically significant reduction in worm burden, regardless of the time factor.

N. A. Hancock

- 2218**—YAZIMA, F. & MACHIDA, K., 1958. [Department of Public Health, School of Medicine, Chiba University, Chiba, Japan.] [On the ecological relations of the parasite state of *Ancylostoma caninum*, especially on the density effect of population.] *Japanese Journal of Parasitology*, **7** (6), 631–640. [In Japanese: English summary pp. 639–640.]

Ecological investigations were carried out on canine hookworms, *Ancylostoma caninum*, which were removed from dogs in Chiba Prefecture, Japan. A crowding effect was observed on their body-weight, body length and physiological conditions, since they were always in a limited area of the gastro-intestinal tract.

Y. Yamao

Pathogenesis

See also Nos.: 1600, 1601, 1602, 1603, 1604, 1608, 1609, 1610, 1614, 1633, 1638, 1641, 1647, 1649, 1651, 1652, 1654, 1655, 1658, 1660, 1665, 1687, 1697, 1698, 1701, 1702, 1706, 1711, 1719, 1745, 1746, 1748, 1753, 1766, 1772, 1774, 1779, 1780, 1781, 1782, 1790, 1825, 1851, 1853, 1870, 1871, 1880, 1884, 1885, 1888, 1900, 1904, 1910, 1912, 1918, 1919, 1920, 1922, 1933, 1956, 2073, 2134, 2137, 2276, 2331.

2219—ABO, S., 1957. [Department of Surgery, Hirosaki University, Hirosaki, Japan.] [Experimental study on the change of the pancreas caused by the *Ascaris* invasion into the biliary passage.] **Hirosaki Medical Journal**, 8 (3), 538–557. [In Japanese.]

Using dogs as experimental animals, a catheter was inserted into the bile-duct to simulate bile-duct ascariasis. The main pancreatic duct was also ligated. The catheter was left for 24 hours and then withdrawn, the animals being subsequently autopsied. All of them showed slight pancreatitis. Also, the pancreatic enzymes in the bile increased some time after insertion of the catheter. When the catheter was removed after an hour, chronic pancreatitis was observed some days later. In all cases, dilatation of the common bile-duct was seen. These facts would suggest that, in the early stages of bile-duct ascariasis, the pancreas was also more or less affected.

Y. Yamao

2220—AREAN, V. M., 1958. [School of Tropical Medicine, University of Puerto Rico, San Juan, Puerto Rico.] "Ascaridic granuloma. An experimental study." **Archives of Pathology**, 66 (4), 427–438.

Experimental inoculation of *Ascaris lumbricoides* eggs into the liver and portal vein of rabbits resulted in an inflammatory reaction, the severity of which was proportional to the number of eggs present at a particular site. The lesions were induced in the absence of bacteria or products of adult worms. Two hours after inoculation the eggs were surrounded by eosinophils, which were followed within 16 hours by increasing numbers of monocytes, giant cells and fibroblasts. Pseudotubercle formation was apparent at the end of a week and, in cases of large inocula, abscess formation within 16 hours of injection. Healing occurred by hyalinization with more or less extensive fibrosis. The similarity of the lesions induced experimentally to those reported in human infections is discussed and the work is amply illustrated by photomicrographs.

G. I. Pozniak

2221—ARORA, U. S., BHADURI, N. V. & BASU, S. P., 1958. "Radiological lymphangiography in chronic filarial lymphoedema of the inferior extremity: preliminary observations." **Bulletin of the Calcutta School of Tropical Medicine**, 6 (2), 56–57.

The radiological lymphangiographic picture of eight patients with chronic filarial lymphoedema of the legs and showing no microfilariae in the blood, was compared with that of four normal persons. The extent and type of radiological visualization indicated that obstruction occurred somewhere in the middle of the thigh. The lymphatics were numerous, dilated, valveless and with a tortuous course; some retrograde filling was observed. The inguinal lymph nodes were not visualized.

G. I. Pozniak

2222—ARORA, U. S., BHADURI, N. V. & MUKHERJEE, K. L., 1958. "Study on the protein content of plasma and lymph in chronic filarial lymphoedema." **Bulletin of the Calcutta School of Tropical Medicine**, 6 (2), 57–58.

The average total protein content of 3.9 gm. per 100 c.c. (range 1.25 to 6.2) in the peripheral lymph of 15 patients suffering from chronic filarial lymphoedema shows a fivefold rise over that in normal persons (0.69 gm. %). The average albumin and globulin ratio of these patients was 1.5:1 (normal ratio 2:1). These observations indicate an increasing degree of lymph stasis in these infections. The protein contents of blood serum, varying from 5.6 to 7.5 gm. %, stayed within the normal range.

G. I. Pozniak

- 2223**—ASAI, M., ET AL., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [On the serum protein in experimental ancylostomiasis. I.] **Acta Scholae Medicinalis in Gifu**, **7** (2), 517–523. [In Japanese: English summary, p. 517.]

Dogs and rabbits were infected with immature adult canine hookworms directly into their peritoneal cavity. Changes in the serum proteins were then investigated with paper electrophoresis. In rabbits, the total serum proteins decreased at first, reaching the minimum value on the fourth day, thereafter gradually increasing; while in dogs they increased until the seventh day and then gradually decreased but showed higher figures than the pre-infection value even on the fourteenth day. The decrease of the total serum proteins in the rabbits was due to the decrease in albumin, whereas in dogs, the ratios of the serum protein fractions remained almost normal.

Y. Yamao

- 2224**—ASAI, M., ET AL., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [On the histological observation in the case of enclosing young hookworms into abdominal cavities of rabbits. I.] **Acta Scholae Medicinalis in Gifu**, **7** (2), 529–531. [In Japanese: English summary p. 529.]

Immature canine hookworms were introduced into the peritoneal cavity of rabbits. The worms were found alive in adhesions of the peritoneum and major omentum. Pus formation, the centre of which was necrotic, was noted around the worm body.

Y. Yamao

- 2225**—BAILEY, W. S., 1959. [Alabama Polytechnic Institute, Auburn, Alabama, U.S.A.] “Esophageal sarcomas associated with *Spirocerca lupi* infection in the dog.” **International Veterinary Congress (16th)**, **Madrid**, May 21–27, 1959. Vol. II, p. 283.

16 cases of oesophageal sarcoma were encountered on autopsy of 1,969 dogs aged over six months and all were from among a group of 163 dogs which had been infected with *Spirocerca lupi*. Metastasis occurred in various organs in six of the osteosarcomas and three of the fibrosarcomas, and periosteal changes were seen in the long bones of nine of the dogs.

G. I. Pozniak

- 2226**—CALÒ, A., 1957. “La cardiopatia da anchilostomi” **Folia Medica. Naples**, **40** (3), 165–186. [English and French summaries p. 183.]

Calò, after summarizing the conditions leading to parasitic infections in some tropical and subtropical countries, describes cardiopathy due to ancylostomiasis. Clinical symptoms, which are described in detail, are those of progressive cardiac insufficiency accompanied or not by anginous signs and electrocardiographic changes. On the basis of anatomo-pathological changes this cardiopathy is classed as a myocardosis. Pathogenesis is found to be mainly anaemic and toxic. In some cases, however, allergic symptoms and especially chronic alimentary insufficiency were observed to contribute to it. The importance of such factors as malnutrition, weariness and bad hygienic conditions in the incidence of the disease is stressed.

N. Jones

- 2227**—CHAPMAN, R. A., 1960. [Kentucky Agricultural Experiment Station, Lexington, Kentucky, U.S.A.] “The effects of *Meloidogyne incognita* and *M. hapla* on the growth of Kenland red clover and Atlantic alfalfa.” **Phytopathology**, **50** (3), 181–182.

Kenland red clover and Atlantic lucerne were inoculated with larvae of *Meloidogyne incognita* or *M. hapla* at rates of 3,000 or 1,000 larvae per half-gallon crock containing four clover or five lucerne seedlings. The effects were measured by dry weights of frequent cuts. The growth of red clover was severely reduced by both nematodes, although more rapidly by *M. incognita*, and the roots were badly galled. Lucerne was severely affected by *M. hapla*, but *M. incognita* caused insignificant reduction in growth until the end of the experiment (381 days). The roots of all inoculated plants were galled. The effects produced on both plants by *M. hapla* were more severe at the higher inoculum level but with *M. incognita* the over-all results were the same at both levels.

M. T. Franklin

- 2228**—DANARAJ, T. J., 1959. “Pathologic studies in eosinophilic lung. (Tropical eosinophilia).” **Archives of Pathology**, **67** (5), 515–524.

Danaraj describes a complete pathological study of an adult Ceylonese man who died of encephalopathy after treatment for eosinophilia of the lung with nearsphenamine. The significant

histological finding was the presence of foreign-body granulomata in the lungs. Granulomatous lesions were not found in a series of liver biopsies, but there was periportal infiltration with leucocytes, which was thought to be non-specific. Similar changes were found in liver biopsies from cases of filariasis. Lymph node biopsy did not show any significant abnormality.

G. Lapage

- 2229—DÍAZ-RIVERA, R. S. ET AL., 1957. [University of Puerto Rico School of Medicine, San Juan 22, Puerto Rico.] "The pathogenesis of Manson's schistosomiasis." *Annals of Internal Medicine*, **47** (6), 1082–1107.

Díaz-Rivera *et al.* review the pathogenesis of Mansonian schistosomiasis in the light of more than 400 cases, twelve of which are described in detail as being representative. The earliest phase is dominated by a hypersensitivity state of abrupt onset, following a variable (21 to 42 days) asymptomatic incubation period. The acute disease is generally mild, even subclinical. The explosive disease is seen only in the heavily infected and poorly nourished patient, in whom extensive pathologic alterations may occur. Local reaction due to eggs and/or adult worms leads to vascular changes in liver, intestine and lungs; and actual tissue destruction and foreign-body reaction of allergic origin may occur. In some cases the picture may be dominated by portal hypertension with fragile oesophageal varices and congestive splenomegaly, while in others the prominent feature is chronic cor pulmonale with pulmonary hypertension from arteriolitis. The severity of the clinical picture is chiefly influenced by socio-economic factors and the adequacy of the defensive mechanism of the host.

J. M. Watson

- 2230—DJAFAR, M. I., SWANSON, L. E. & BECKER, R. B., 1960. [Department of Veterinary Science, University of Florida, Gainesville, Florida, U.S.A.] "Clinical and hematologic studies on pure *Dictyocaulus viviparus* (Bloch) lungworm infection in calves." *Journal of the American Veterinary Medical Association*, **136** (5), 200–204.

Eighteen calves were used in experiments to determine the clinical and haematological responses to lungworm infections of *Dictyocaulus viviparus*. The infected calves exhibited the clinical symptoms of coughing, increased respiratory rate with expiratory dyspnoea, tactile fremitus, serous nasal discharge, pyrexia, increased pulse rate, loss of weight and diarrhoea. The haematological examinations showed that there were no alterations in the total erythrocyte count, haematocrit value, haemoglobin, immature neutrophil, basophil and monocyte counts or α -globulin levels during the infection. There were significant increases in the γ -globulin levels commencing shortly after infection and reaching a peak on the 35th day. In calves with non-fatal infections there was also a significant eosinophilia. Calves which died had a moderate increase in γ -globulin which was delayed until after the 14th day and they also had a low eosinophil response.

K. R. Heath

- 2231—GRIGOREV, N. K., 1959. [The role of *Heterakis gallinae* in the formation of nodules in the caecum of domestic fowls.] *Trudi Moskovskoi Veterinarnoi Akademii*, **25**, 237–244. [In Russian: English summary p. 244.]

The types of nodules present in the caeca of chickens were (i) uncomplicated nodules of lymphoid or lymphoid-glandular type and (ii) nodules (of the lymphoid-glandular type) complicated by *Heterakis* infection. These appeared 12 days after infection and were found in the central section of the caecum below the attachment of the mesentery and, in rosette-like formation, in its apex. The incidence and distribution of the nodules and of *Heterakis* shows that the worms enter already formed nodules causing hyperplasia followed by necrosis.

G. I. Pozniak

- 2232—GRIGOREV, N. K., 1959. [Pathological changes in the caecum and liver of domestic fowls infected with *Heterakis*.] *Trudi Moskovskoi Veterinarnoi Akademii*, **25**, 245–254. [In Russian: English summary p. 254.]

24 chicks were infected with *Heterakis gallinae* and examined 3 to 37 days later. In the caecum, larvae were found from the third day in the lumen and mucosal epithelium of the central section, by the 17th day most had moved up to the apex where they matured. The worms were in close association with the mucosa, some embedding their heads in it, others entering

nodules [see also abstract No. 2231 above]. The affected mucosa showed infiltration of lymphoid cells and eosinophils and atrophy and necrosis of the epithelial cells. In the liver, hyperaemia of the vessels, hyperplasia of lymphoid cells and eosinophilia were observed.

G. I. Pozniak

2233—HAMILTON, P. K., HUTCHISON, H. S., JAMISON, P. W. & JONES, Jr., H. L., 1959. "The pathology and pathogenesis of the hepatosplenic disease associated with schistosomiasis ('Egyptian splenomegaly')." *American Journal of Clinical Pathology*, **32** (1), 18–33.

Hamilton and his colleagues describe and illustrate with photographs lesions found in biopsies of the liver taken from 73 Egyptian patients with Egyptian splenomegaly while splenectomies were being done on them. Microscopic evidence of schistosomal infection was found in all but 10 of the patients. The histological changes were classified as pipe-stem portal cirrhosis (26 cases), coarse nodular cirrhosis (19 cases), diffuse portal cirrhosis (15 cases), and focal portal cirrhosis (10 cases). Two patients showed portal fibrosis with amyloidosis, while one had subacute focal hepatic necrosis due to schistosome infection. Dead adult worms were found in seven cases (some from each of the above groups) and schistosome eggs were found in 74% of the liver biopsies. Dark brown schistosomal pigment resembling haematin was found in 53% of the biopsies and this was related to the presence of eggs. Macroscopic abnormalities sought for in 49 cases included abnormalities of the liver in all cases and of the gall-bladder in 71%, postcaval collateral circulation in 49%, schistosomal tubercles in the omentum, mesentery and colon serosa in 57% and ascites in 69%. The weights of the spleens removed varied from 550 to 2,420 gm. and they all showed fibrocongestion, but no schistosome eggs were found in any of them and schistosomal pigment was inconstant. Hamilton and his colleagues conclude that schistosomiasis is the major aetiological factor in liver disease found in Egyptian splenomegaly and that the liver disease arises from intrahepatic thrombophlebitis and peripylephlebitis due to dead worms and live eggs. Chemotherapy may precipitate these changes and dietary deficiency may predispose the liver to them.

G. Lapage

2234—ISHAK, K. G., LEGOLVAN, P. C., SALIB, M., SABOUR, M. & NOOMAN, Z., 1959. [Department of Pathology, United States Naval Medical Research Unit No. 3, Cairo, Egypt.] "Needle biopsy of the liver and spleen in schistosomiasis. A histopathologic study." *American Journal of Clinical Pathology*, **31** (1), 46–59.

The authors report the histological findings in material obtained by needle biopsy of the liver (in 61 cases) and of the spleen (in 31 cases) of patients showing schistosome eggs amongst other changes in the liver. Only 25 of these patients revealed ova in the urine or faeces or both. Needle biopsy material was also studied from the livers of 54 persons who were passing eggs in the urine or faeces or both but of these only 29 manifested signs of hepatic schistosomiasis. In the former group the over-all incidence of hepatic involvement was 70.8%. Their detailed observations are discussed, tabulated and illustrated with a series of photomicrographs.

S. Willmott

2235—JONES, J. E., NEWSOM, L. D. & FINLAY, E. L., 1959. "Effect of the reniform nematode on yield, plant characters, and fiber properties of upland cotton." *Agronomy Journal*, **51** (6), 353–356. *Rotylenchulus reniformis* reproduced on cotton and caused serious injury to all the varieties tested. No effect was noticed on seed size, or the length, strength or fineness of the fibre. Yield, however, was appreciably reduced. The nematode increased wilt development in wilt-susceptible varieties, but not in wilt-resistant varieties.

A. M. Shepherd

2236—KHAN, S. A., 1959. "Pathogenic effects of *Pratylenchus zeae* on sugarcane." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] *Phytopathology*, **49** (9), 543.

Khan maintained pure populations of *Pratylenchus zeae* alone and in combination with *Phytophthora* sp. on sugar-cane. *P. zeae* alone and with *Phytophthora* sp. caused significant reduction in plant cane yield but not in stubble cane yield. Populations of *P. zeae* were higher in roots containing the fungus.

D. J. Hooper

2237—KOBAYASHI, M., ET AL., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [On the serum protein in experimental ancylostomiasis. II.] *Acta Scholae Medicinalis in Gifu*, **7** (2), 524–528. [In Japanese: English summary p. 524.]

Dogs were experimentally infected with canine hookworms. The total serum proteins showed a marked decrease at the time the worms became adult. The decrease in the total serum proteins was almost entirely due to the decrease in the albumin fraction, the globulin fraction remaining unchanged. The decrease in the total serum proteins preceded an anaemia.

Y. Yamao

2238—KOBAYASHI, M., ET AL., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [On the histological observation in the case of enclosing young hookworms into abdominal cavities of dogs. II.] *Acta Scholae Medicinalis in Gifu*, **7** (2), 532–534. [In Japanese: English summary p. 532.]

A number of immature canine hookworms were injected into the peritoneal cavity of adult dogs. Fourteen days later the dogs were examined post mortem. The worms were found only in the capsule and parenchyma of the peritoneal lymph nodes. A slight enlargement of lymph follicles and a proliferation of connective tissue were observed. Around the worm body, connective tissues had formed and lymphocyte infiltration was noted. Thromboses were found in some small vessels.

Y. Yamao

2239—KUTTLER, K. L. & MARBLE, D. W., 1960. [Agricultural Experiment Station, University of Nevada, Reno, Nevada, U.S.A.] "Serum protein changes in lambs with naturally acquired nematode infections." *American Journal of Veterinary Research*, **21** (82), 445–448.

In lambs clinically parasitized with a predominantly *Haemonchus* infection, serum protein and all serum protein fractions showed significant changes. The total serum protein and the albumin fraction were decreased; and alpha-1 and alpha-2 globulin, beta globulin, and gamma globulin fractions were increased. Significant changes in serum protein also occurred with moderate parasitism. Similar changes, although less severe, occurred in serum protein of non-parasitized lambs with induced anaemia.

R. V. Brunsten

2240—LARIZZA, P. & VENTURA, S., 1959. "Recent advances in pathogenesis of hookworm anaemia." *Scientia Medica Italica*. English edition, **7** (3), 411–461.

In Umbria hookworm infection is spreading and becoming of social importance. Seeking to explain the variable degree to which hookworm anaemia develops, Larizza & Ventura have previously maintained that the previous or resultant state of the iron reserves are the most important considerations. They here further support their ideas by evidence obtained by studies with radio-active iron, which may be eliminated as quickly by some non-anaemic carriers of the worms as by some anaemic infected patients. They find no evidence of toxic action by the worms on the peripheral blood or bone marrow and that the biochemical aspects of hookworm anaemia are identical with those of any pure sideropenic anaemia. Their studies of Italian patients do not confirm that protein deficiency impedes haemoglobin production, but they agree that this may occur in some tropical countries.

G. Lapage

2241—LELAND, Jr., S. E., DRUDGE, J. H. & WYANT, Z. N., 1960. [Department of Animal Pathology, Kentucky Agricultural Experiment Station, Lexington, Kentucky, U.S.A.] "Studies on *Trichostrongylus axei* (Cobbold, 1879). VI. Total serum protein, blood and plasma volume, and electrophoretic serum fractionation in infected and uninfected lambs." *American Journal of Veterinary Research*, **21** (82), 458–463.

Ten cross-bred lambs raised helminth-free were inoculated with *Trichostrongylus axei* larvae and a further two animals served as helminth-free controls. The dose range was 100,000 to one million larvae and at the time of inoculation the lambs were three-and-a-half to five-and-a-half months old. In lambs infected with 250,000 or more larvae, there were marked deviations from the pre-infection or control values for serum proteins and blood and plasma values. Possible causes of these deviations are discussed. Serum protein alterations observed were (i) hypoproteinaemia, and (ii) hypoalbuminaemia with an increase in the gamma globulins. The sequence of events with respect to blood and plasma alterations in infected animals is described.

R. V. Brunsten

- 2242**—LELAND, Jr., S. E., DRUDGE, J. H., WYANT, Z. N. & ELAM, G. W., 1960. [Department of Animal Pathology, Kentucky Agricultural Experiment Station, Lexington, Kentucky, U.S.A.] "Studies on *Trichostrongylus axei* (Cobbold, 1879). V. Some quantitative and pathologic aspects of experimental infections with a horse strain in sheep." **American Journal of Veterinary Research**, **21** (82), 449–457.

19 sheep, 76 to 657 days old, were given equine *Trichostrongylus axei* larvae. The LD₅₀ was 580,000 larvae and, in the seven sheep that died, the interval between infection and death ranged from 20 to 97 days. In 12 sheep the average prepatent period was 23·3 days. The male to female ratio was 0·57 for 12 animals. Clinical signs evident at the 250,000 larval dose level were: reduced feed and water consumption, progressive cachexia, weight loss, listlessness, loss of wool resiliency and progressive weakness. Pathological changes in the abomasal mucosa are described. Elevation of the red blood cell volume and eosinophilia were observed in the early stages of infection. A strong immunity to massive challenging doses of larvae followed recovery from initial infection. The equine strain of *T. axei* appeared to be less pathogenic for sheep than other strains studied.

R. V. Brunsten

- 2243**—LOEWENBERG, J. R., SULLIVAN, T. & SCHUSTER, M. L., 1960. [Department of Plant Pathology, University of Nebraska, Lincoln, Nebraska, U.S.A.] "Gall induction by *Meloidogyne incognita incognita* by surface feeding and factors affecting the behavior pattern of the second-stage larvae." **Phytopathology**, **50** (4), 322–323.

Single larvae of *Meloidogyne incognita* placed 3 mm. from the root tips of tomato plants growing aseptically in 1% nutrient agar reached the roots in about 45 minutes, usually at a point within 1 cm. of the tip but occasionally in the second cm. There was no indication that the root tips of intact plants were repellent. For the first 12 to 24 hours the larva fed and moved along the root, then remained feeding in one area for 12 to 23 hours and subsequently entered the root at this point. Over three hours were required for complete entry. Gall formation often began before the nematode had completely entered the root or occasionally after it had moved away. In the latter case the galls remained small. *M. incognita* larvae were not attracted to *Brassica nigra* roots except when sucrose or cellobiose was added to the medium, when they went directly to the roots, fed and entered. Gall formation occurred in these plants.

M. T. Franklin

- 2244**—MAI, W. F., 1960. [Department of Plant Pathology, Cornell University, Ithaca, New York, U.S.A.] "Growth of apple seedlings in relation to soil temperature and inoculation with *Pratylenchus penetrans*." **Phytopathology**, **50** (3), 237–238.

Addition of about 4,000 *Pratylenchus penetrans* per pot to apple seedlings growing in three-inch pots of steam-sterilized soil at temperatures ranging from 45°F. to 85°F. caused marked decrease of top and root growth, the greatest decrease, compared with uninoculated plants, occurring at the highest temperature. The feeder roots showed typical symptoms of attack by this nematode.

R. D. Winslow

- 2245**—MARCHAND, E. J., MARCIAL-ROJAS, R. A., RODRÍGUEZ, R., POLANCO, G. & DÍAZ-RIVERA, R. S., 1957. [University of Puerto Rico School of Medicine, Puerto Rico.] "The pulmonary obstruction syndrome in *Schistoma mansoni* pulmonary endarteritis. Report of five cases." **Archives of Internal Medicine**, **100** (6), 965–980.

Marchand *et al.* give a detailed and well illustrated report on five cases of schistosomal cardio-pulmonary disease due to *Schistosoma mansoni*. Stress is laid on the clinical and laboratory aspects with particular reference to the histopathological, radiological and electrocardiographic findings. Wide-spread pulmonary obliterative arteriolitis due to multiple ova emboli is responsible for the clinical picture. Pulmonary artery hypertension leads to right ventricular hypertrophy and eventually right-sided heart failure. The ECG shows right axis deviation, right ventricular hypertrophy and frequently incomplete right bundle-branch block. X-ray examination and angiocardiology reveal dilatation of the pulmonary artery segment, increased hilar and diminished peripheral pulmonary vascular markings, and right ventricular prominence. It is of cardinal importance to differentiate this syndrome from cor pulmonale due to pulmonary parenchymal disease and primary heart disease. Longevity is short once cardiac decompensation develops. The authors warn against the use of intensive antimony treatment which is toxic to the myocardium. Since the paper was completed five additional cases of schistosomal cor pulmonale showing similar findings have been observed.

J. M. Watson

- 2246**—NOGUCHI, I., KIRISAWA, T., SUGIURA, K. & KOMINE, S., 1958. [Hokuriku Branch Laboratory, National Institute of Animal Health, Japan.] [Studies on liver function tests. I. Liver function tests on sheep infected with liver fluke.] **Journal of the Japan Veterinary Medical Association**, **11** (3), 113–115. [In Japanese.]

Sheep were experimentally infected with *Fasciola hepatica* and liver function tests were performed. The blood sugar value, BSP test and albumin-globulin ratio changed while the parasites were migrating through the liver parenchyma. Serum cholesterin, bilirubin, total proteins, colloidal reaction and urine urobilinogen also changed after the parasites settled in the bile-ducts. Of the bilirubin secretion test, the criterion value of the serum bilirubin and urine urobilinogen should be lowered for sheep, those for human standards being too high. The standard time interval of the BSP secretion test should be shortened for sheep. Serum colloidal reactions should be regarded as pathological when they are shown as \pm . Y. Yamao

- 2247**—OGINO, Y., 1959. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [The relation between anaemia and ancylostomiasis in the rural area. 2. The environmental factors relating to haemoglobin contents in blood of non-infected cases.] **Japanese Journal of Parasitology**, **8** (4), 509–514. [In Japanese: English summary pp. 513–514.]

In a previous paper, it was made clear that about 30% of the residents of rural areas of Japan who had no hookworm, were anaemic. The correlations between several items investigated and haemoglobin concentration were found to be statistically significant with variable limits of confidence. Limit of confidence (highest value) of number of reticulocytes was 80%; sleeping time 50%; farming time 98%; flicker value 70%; Livi's index 99%; amount of animal protein consumed 80%; frequency of pregnancy 99%; haemorrhagic disease 30%; neuralgia 80%; tendency to constipation 98%. Not one item was considered to be a dominant cause of this anaemia. Y. Yamao

- 2248**—OGUNI, H., KIMATA, H., HOSOYA, H. & MIYAMOTO, Y., 1959. [School of Veterinary Medicine, Nihon University, Tokyo, Japan.] "On the diagnosis of cerebrospinal nematodiasis by cell counts of cerebrospinal fluid." **International Veterinary Congress (16th), Madrid**, May 21–27, 1959. Vol. II, pp. 585–586.

The number of cells and of acidophils in the cerebrospinal fluid of goats (obtained by lumbar puncture) increased remarkably about ten days after the onset of cerebrospinal nematodiasis, and both the Pandy and the Nonne-Apelt reactions for proteins were positive. Subsequently the number of cells (including acidophils) decreased gradually, while lymphocytes appeared to increase. There was no remarkable increase of acidophils in the blood. This conspicuous reaction was not observed in horses at a later stage of infection, although in nine out of thirteen, small numbers of acidophils were present. It is concluded that the increase in cells and the appearance of acidophils in the cerebrospinal fluid can be employed for the diagnosis of this disease. G. I. Pozniak

- 2249**—OZERETSKOVSKAYA, N. N. & VIKHERT, A. M., 1960. [Klinicheski sektor, Institut malyarii, meditsinskoi parazitologii i gelmintologii, Ministerstvo zdoravookhraneniya SSSR, Moscow.] [Systemic vasculitis in trichinelliasis.] **Klinicheskaya Meditsina. Moscow**, **38** (3), 67–76. [In Russian: English summary p. 76.]

Ozeretskoykaya & Vikhert report that a peculiar form of vascular pneumonia was found in three out of 30 cases of trichinelliasis, together with myocarditis in one, and an abdominal pain syndrome with haemorrhagic eruptions of the skin in two cases. Fever and oedema were alleviated by administration of ACTH within 24 to 48 hours. Further improvements were observed within the following three to four days. Vasculitis of an allergic nature was revealed at the post-mortem of one patient, who died of trichinelliasis, together with manifestations of bilateral pneumonia, an oedemato-haemorrhagic syndrome and thrombosis of the vessels of the lower limbs. N. Jones

- 2250**—PATZ, I. M., 1959. [Middelburg, Transvaal, South Africa.] "Acute eosinophilic pneumonia possibly due to infection with *Ascaris lumbricoides*." **Central African Journal of Medicine**, **5** (8), 399–404.

Patz reports 12 cases of acute eosinophilic pneumonia in adult Bantu which, on circumstantial evidence, are believed to have been due to infection by *Ascaris lumbricoides*. Clinical and

radiological features are described and laboratory tests including blood counts, sputum, urine and stool examinations, and various allergic tests were carried out; as well as the acute nature of the symptoms and the eosinophilia, 11 of the patients passed *A. lumbricoides* ova in stools, some vomited roundworms and some passed them in their faeces.

G. Froyd

2251—POPOW, J., 1959. [Zakład Anatomii Patologicznej, Akademia Medyczna, Białystok, Poland.] "Bąblowiec wielokomorowy wątroby i płuc." **Wiadomości Parazytologiczne. Warsaw**, 5 (6), 563–567. [English summary p. 567.]

Popow describes multilocular hydatid of the liver and lungs as observed at the post-mortem of a 20-year-old man. Histopathological changes in the cardiac muscle, in connection with the infection, are also described.

N. Jones

2252—QUATTROCCHI, G., 1957. [Istituto di Medicina del Lavoro dell'Università di Napoli, Italy.] "Su alcuni aspetti patogenetici delle alterazioni elettrocardiografiche nell'anemia da anchilostoma." **Folia Medica. Naples**, 40 (12), 1049–1056. [English and French summaries pp. 1055–1056.]

Quattrocchi describes electrocardiographic changes observed in some hundred cases of ancylostomiasis. There was no connection between these changes and the degree of anaemia. In fact, electrographic alterations rapidly receded after intravenous administration of organic trivalent iron before the state of anaemia was altered. It is concluded that the fundamental factor responsible for the electrocardiographic changes is absence of the iron ion at the level of the myocardium.

N. Jones

2253—ROCHE, M., & PÉREZ-GIMÉNEZ, M. E., 1959. [Instituto de Investigaciones Médicas, Fundación Luis Roche, Apartado 1827, Caracas, Venezuela.] "Intestinal loss and reabsorption of iron in hookworm infection." **Journal of Laboratory and Clinical Medicine**, 54 (1), 49–52.

The intestinal loss and reabsorption of iron in hookworm infections was measured by marking the circulating erythrocytes in 14 patients with radio-active chromium (Cr^{51}) and iron (Fe^{59}). Radio-activity from either isotope was measured in the blood and faeces with a pulse light analyser. Radio-activity from Cr^{51} indicated the loss of blood and iron due to hookworms and that from Fe^{59} the amount of iron actually lost through the faeces. On the average, 44.1% (13.1 to 76.4) of iron lost into the intestine was reabsorbed.

G. I. Pozniak

2254—SHOHO, C. & NAIR, V. K., 1960. [University of Khartoum, Sudan.] "Studies of cerebrospinal nematodiasis in Ceylon. (VII). Experimental production of cerebrospinal nematodiasis by the inoculation of infective larvae of *Setaria digitata* into susceptible goats." **Ceylon Veterinary Journal**, 8 (1), 2–12.

Five goats (pure Jamnapari kids and the F_1 generation of a cross with an indigenous breed) were inoculated with infective larvae of *Setaria digitata*. On autopsy of three of the four goats showing nervous disturbances, lesions suggestive of destruction of the nerve tissue by wandering nematodes, but not the worms, were observed in the central nervous system. In one goat, a cuticular ring was found in a tumour-like growth under the dura mater. Resistance to cerebrospinal nematodiasis due to *S. digitata* appears to be greater in young animals.

G. I. Pozniak

2255—STANDIFER, M. S. & PERRY, V. G., 1960. [Firestone Plantations Company, Harbel, Liberia, West Africa.] "Some effects of sting and stubby root nematodes on grapefruit roots." **Phytopathology**, 50 (2), 152–156.

Standifer & Perry show, by field observations and inoculation experiments, the pathogenicity of *Belonolaimus longicaudatus* and *Trichodorus christiei* to grapefruit (*Citrus paradisi* Macf.). Histological studies of normal and attacked roots, (illustrated by photographs of sections), show differences in the effect of feeding by the two nematode species. *B. longicaudatus* causes a lesion which consists of a cavity surrounded by affected cells which have ruptured walls and coagulated protoplasm. *T. christiei* causes a maturation of the apical meristem but lesions are not formed. The abnormalities exhibited by attacked roots are discussed. These may be due to enzymic activity of secretions from the nematodes sometimes affecting cells some distance from the lesion, or to a response by the plant to attack.

D. J. Hooper

- 2256**—TORZECKI, Z., 1959. [Łódź, Narutowiczo 120, Poland.] "Glistnica w materiale sekcyjnym w Hamhynie (Korea)." *Wiadomości Parazytologiczne. Warsaw*, 5 (6), 553–562. [English summary p. 562.]

Torzecki found evidence of ascariasis in autopsy material from 69.3% of 277 persons over two years old at the Medical Academy of Hamhyn (Korea) from August 1955 until the end of 1957. In over 10% of the cases various complications existed. Intestinal occlusion, appendicitis, ascariasis of the biliary tract, gall-stones, liver abscesses, peritonitis, pulmonary embolism, ascariasis of the pancreas and ascariasis of the posterior mediastinum are discussed. In all cases in which ascarids occurred in the abdominal cavity their route through the intestine was detectable. N. Jones

- 2257**—TURLIGINA, E. S., 1957. [Gelmintologicheskaya Laboratoriya, Akademiya Nauk SSSR, Moskva, U.S.S.R.] [On the respiratory process in plants as affected by root-knot nematodes.] *Doklady Akademii Nauk SSSR*, 115 (6), 1227–1228. [In Russian.]

Turligina measured (in mm. of carbon dioxide output per hour) the effect of *Meloidogyne incognita* infections on respiration of the roots of several vegetables. In cucumbers, a rate of 1.36 in 1 mm. galls progressively fell to 0.96 in 20 mm. galls and rose again in decomposing galls, but was always higher than in healthy rootlets (0.82). Results were similar in lettuces and beans. In peppers and egg-plants, however, respiration was lower in galls (0.22 and 1.54 respectively) than in healthy roots (0.33 and 2.31). In peas, a low rate of 2.6 in 1 mm. galls rose to 7.1 in 3 mm. galls, then fell to 5.8 in 10 mm. galls; the rate in healthy roots was 3.8. This change in respiration is explained in terms of the increased synthesis and decomposition of substances, trauma of tissues and bacterial activity. G. I. Pozniak

Immunity

See also Nos. 1819, 1821, 1847, 1869, 1870, 1871, 1886, 1896, 1908, 1919, 1920, 1921, 1923, 1930, 1948, 1951, 2181, 2242.

- 2258**—BORTOLINI, G., 1959. [Clinica delle Malattie Tropicali dell'Università di Roma, Italy.] "Immunità e allergia nella diagnosi della malattia da *Schistosoma* (rivista sintetica)." *Archivio Italiano di Scienze Mediche Tropicali e di Parassitologia*, 40 (3), 145–168. [English, French & German summaries pp. 165–166.]

Bortolini, after an introductory note on immunity in general, reviews work on the immunology of schistosomiasis. Intradermal reactions, complement deviation, demonstration of the presence of specific antibodies in the serum and precipitins are among the immunological tests considered. Numerous deductions are drawn from the researches and studies quoted. N. Jones

- 2259**—CANCIO, M., SALA, A. R. DE & RODRIGUEZ-MOLINA, R., 1959. [Veterans Administration Center, General Medical Research Laboratory, San Juan, Puerto Rico.] "Electrophoretic isolation of circumoval precipitins in the serum of individuals infected with *Schistosoma mansoni*." *Experimental Parasitology. New York*, 8 (6), 549–556.

Cancio *et al.* identified six fractions in serum from patients infected with *Schistosoma mansoni*. The technique used was that of continuous flow paper curtain electrophoresis. The fractions were albumin, alpha-1-globulin, alpha-2-globulin, beta-globulin, gamma-1-globulin and gamma-2-globulin. Circum-oval precipitin tests were performed on the fractions and only one, the gamma-1-globulin fraction, gave a positive result. D. L. H. Robinson

- 2260**—DANARAJ, T. J. & SCHACHER, J. F., 1959. [Departments of Medicine and Parasitology, University of Malaya, Singapore.] "Intradermal tests with *Dirofilaria immitis* extract in eosinophilic lung (tropical eosinophilia)." *American Journal of Tropical Medicine and Hygiene*, 8 (6), 640–643.

The intradermal test, performed with 1% saline extract of *Dirofilaria immitis* powder on five groups of persons in Singapore, was positive in all of 62 Asians with tropical eosinophilia, in 73.5% of 49 with filariasis, in 59.4% of 32 with mild eosinophilia, in 53.3% of 75 normal Asians and in only 4.5% of 66 normal recent British settlers. The filarial complement fixation test using a 1% alcoholic extract of the same antigen was positive in 100% of the tropical

eosinophilia group and in 24.5% of the filariasis patients. Skin sensitivity to *D. immitis* antigen persisted in cases of eosinophilic lung even when the previously positive serologic reactions had become negative following treatment with diethylcarbamazine. It is concluded that the intradermal test cannot be used for the diagnosis of either filariasis or tropical eosinophilia in Singapore—an endemic area—and that infection by species of filarial worms normally found in animals is the possible aetiology of tropical eosinophilia.

G. I. Pozniak

2261—ERSHOV, V. S., 1959. [All-Union Institute of Helminthology, Moscow, U.S.S.R.] “The problem of immunization of domestic animals to helminthoses.” **International Veterinary Congress (16th), Madrid**, May 21–27, 1959. Vol. I, pp. 279–289. [French, German & Spanish summaries pp. 286–289.]

Ershov describes his adaptation in 1950 of Alexandrov & Hefen’s method (for bacteria) to the preparation of helminth antigens. Workers at the Institute of Helminthology in Moscow have since used this method for *Ascaridia*, *Toxocara*, *Ascaris suum*, *Fasciola* and *Moniezia expansa* antigens and have also investigated the chemical composition and toxicity of these antigens, proved their antigenic and immunizing properties in laboratory animals and finally tested them for the immunization of domestic animals. These antigens are 60% polysaccharide and 30% to 40% albumin and are highly specific. The ascarid antigen confers complete immunity to 80% of pigs and the effect is prolonged to six months on subsequent administration of large doses of infective eggs. With monieziasis and fascioliasis in sheep and ascaridiasis in chickens, immunization proved less effective than chemical prophylaxis because of the small percentage of animals protected, the short duration of immunity and the high cost of the antigen. Ershov, emphasizing the need for more knowledge of the properties and preparation of antigens, points out that immunization as prophylaxis should be studied only for those major helminthiasis for which prolonged immunity and a high percentage of protection can be achieved.

G. I. Pozniak

2262—HSÜ, S. Y. LI & HSÜ, H. F., 1959. [College of Medicine, State University of Iowa, Iowa, U.S.A.] “The behavior of different geographic strains of *Schistosoma japonicum* in circumoval test.” [Abstract.] **Journal of Parasitology**, **45** (4, Sect. 2), 16.

Chinese, Formosan, Japanese and Philippine strains of *Schistosoma japonicum* were used in comparative circum-oval tests, sera being obtained from infected rabbits and ova from mice. Circum-oval precipitates were stronger between ova and serum of the same strain than between different strains.

N. A. Hancock

2263—IIDA, M., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [Studies on *Ascaris* immunity. I. On the antigenicity of the metabolite, body cavity fluid and worm body extracts.] **Acta Scholae Medicinalis in Gifu**, **7** (1), 78–87. [In Japanese: English summary p. 78.]

Iida confirmed the existence of common antigenicity amongst various antigens from a pig ascarid by testing them against the antiserum obtained from rabbits immunized by a purified culture medium of the ascarid. The antigens tested were : body-cavity fluid, culture medium, a boiled whole worm and the extracts from separated organs (body-wall, reproductive organs and digestive tract). The precipitation reaction observed using boiled worm body antigens and the antigens of the extracts from the various organs was practically the same.

Y. Yamao

2264—IIDA, M., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [Studies on *Ascaris* immunity. II. On the skin reaction and T.M. reaction by the culture media type antigen.] **Acta Scholae Medicinalis in Gifu**, **7** (1), 166–174. [In Japanese: English summary p. 166.]

Iida isolated a culture-medium type antigen from pig ascarid body-cavity fluid, which showed a strong precipitation reaction with the antiserum against the culture media. 1:10,000 dilution of this antigen was injected intradermally into schoolchildren. The cutaneous reaction revealed no particular difference between ascarid carriers and non-carriers. The T.M. reaction seemed a little stronger to the culture media antiserum than to the cavity fluid antiserum.

Y. Yamao

- 2265**—JARRETT, W. F. H., 1959. [University of Glasgow Veterinary School, Glasgow, Scotland.] "Méthode de vaccination contre l'helminthiase." *Bulletin de l'Office International d'Épizooties*, **52**, 241–251. [Also in English pp. 252–261.]

Jarrett reviews his own work and that of other authors concerning immunity to helminthiasis and the production of vaccines against helminthiasis in general and *Dictyocaulus viviparus* in particular. N. Jones

- 2266**—JARRETT, W. F. H. ET AL., 1959. [Veterinary School, University of Glasgow, Glasgow, Scotland.] "Practical vaccination against helminth diseases." *International Veterinary Congress (16th)*, Madrid, May 21–27, 1959. Vol. II, pp. 567–569.

This is a summarized review of the work done at the Veterinary School of Glasgow University since 1952 on the immunology of *Dictyocaulus viviparus* and particularly on the immunity conferred by vaccination with irradiated larvae of this and other nematodes. [For abstracts of the relevant published literature see Helm. Abs., **24**, No. 51i; **26**, No. 472d; **27**, Nos. 67i, 148a, 311c, 311d; and **29**, Nos. 167, 553, 619.] G. I. Pozniak

- 2267**—JUNG, R. C. & PACHECO, G., 1960. [Department of Tropical Medicine and Public Health, Tulane University School of Medicine, New Orleans, Louisiana, U.S.A.] "Use of a hemagglutination test in visceral larva migrans." *American Journal of Tropical Medicine and Hygiene*, **9** (2), 185–191.

For the haemagglutination test the antigens used were made from adult *Ascaris lumbricoides* and adult *Toxocara canis*, titres of 1:160 or more being taken as positive. Of 500 sera from persons with no known contact or symptoms of visceral larva migrans all but two were negative but out of 29 patients with eosinophilia, fever, enlarged liver, pneumonitis and hyperglobulinæmia (the VLM syndrome) 23 were positive to one or both antigens, and of five with Loeffler's syndrome (transitory eosinophilic pneumonitis) only one had a high titre. For helminth infections, out of 35 with *Strongyloides* 18 had high titres, showing a greater degree of cross reactions than any other control. It is suggested the test may be valuable in diagnosis but titres may fluctuate rapidly. W. K. Dunscombe

- 2268**—KAGAN, I. G., NORMAN, L. & ALLAIN, D. S., 1959. [Communicable Disease Center, Public Health Service, Atlanta, Georgia, U.S.A.] "Studies on the serology of echinococcosis." [Abstract.] *Journal of Parasitology*, **45** (4, Sect. 2), 30.

The tannic acid haemagglutination and the bentonite flocculation tests were made with various *Echinococcus granulosus* and *E. multilocularis* antigens. Antisera were prepared in rabbits, and sera from infected patients were evaluated for specificity. Hydatid fluid of *E. granulosus* and cyst antigen of *E. multilocularis* were fractionated with trichloroacetic acid and the fractions tested for specificity. Hydatid fluid was the best antigen in both types of test and scoleces antigens the least specific, none of the antigens being species specific. Trichloroacetic-sodium hydroxide soluble fractions of *E. granulosus* and *E. multilocularis* cyst antigen were more sensitive than the original antigens used. N. A. Hancock

- 2269**—KNIERIM, F., 1959. [Departamento de Parasitología, Universidade de Chile.] "Evaluación de la sensibilidad y especificidad de la reacción de fijación del complemento para la hidatidosis." *Boletín Chileno de Parasitología*, **14** (4), 75–79. [English summary p. 75.]

To test the sensibility and specificity of the complement fixation test of Bozicevich to hydatid disease, Knierim used antigen prepared from hydatid liquid and the sera of patients who were subsequently surgically examined to ascertain if they were infected with hydatid. The end point of the reaction was taken as 50% haemolysis. Of 122 patients in whom hydatidosis was later confirmed, the sera of 74 gave a positive result. Of 130 patients who did not appear to have hydatid infection, five were positive. Four of 20 persons who were known or were thought to have *Fasciola hepatica* infection were also positive to the hydatid test. M. McKenzie

- 2270**—LARSH, Jr., J. E., RACE, G. J. & GOULSON, H. T., 1959. [Department of Parasitology School of Public Health, University of North Carolina, Chapel Hill, North Carolina, U.S.A.] "A histopathologic study of mice immunized with irradiated larvae of *Trichinella spiralis*." *Journal of Infectious Diseases*, **104** (2), 156–163.

Larsh *et al.* gave to each of 23 white mice five doses of 200 irradiated larvae of *Trichinella spiralis* and to 23 immunized controls 200 non-irradiated larvae at the same time, 16

non-immunized further controls remaining uninfected. The mice given the irradiated larvae showed, after a challenging infection with 500 non-irradiated larvae, about the same degree of immunity as mice given the same number of previous infections with non-irradiated larvae, but the titre of serum antibody was considerably higher in the latter group. The inflammatory response was similar to that previously reported in mice, but the response in the mice given the irradiated larvae was, in comparison with that seen in the mice given the non-irradiated larvae, less severe and it required longer to reach its peak. The authors conclude that the pre-adult stage alone can produce a demonstrable immunity and that this is associated with the presence of serum antibodies and a characteristic inflammatory response in the small intestine. The paper is illustrated by eight photographs of the inflammatory reactions and the parasites in the tissues.

G. Lapage

2271—MAGATH, T. B., 1959. [Section of Clinical Pathology, Mayo Clinic and Mayo Foundation, Rochester, Minnesota, U.S.A.] "The antigen of *Echinococcus*." **American Journal of Clinical Pathology**, **31** (1), 1-8.

Both the Casoni intradermal and the complement fixation tests are reliable in the diagnosis of hydatidosis, but whereas the former remains positive for years after the removal or death and calcification of the cyst, the latter detects only living cysts. The antigen can be preserved indefinitely with 1:50,000 merthiolate. The antigenic component of the complement fixing antigen migrates with the γ -globulin fraction on paper electrophoresis but can be separated from it by precipitation with cold acetone-ether mixture. The antibody in the patient's serum is in the γ -globulin fraction. The indirect haemagglutination test appears to be specific for the disease. When tested against cystic fluid from *Echinococcus granulosus* and *E. multilocularis* in double diffusion agar plates, the serum of infected persons forms lines of precipitation; a single line forms with the former and a diffuse band or double lines with the latter. Serum from white rats repeatedly injected with hydatid cyst fluid reacts positively to complement fixation tests but does not produce precipitation in double diffusion agar plates. The substance in the complement fixing γ -globulin fraction does not produce lines of precipitation by double diffusion but the albumin fraction does.

S. Willmott

2272—OKABE, K. & TANAKA, T., 1958. [Department of Parasitology, Kurume University School of Medicine, Kurume-shi, Japan.] "A new urine precipitin reaction for schistosomiasis japonica. A preliminary report." **Kurume Medical Journal**, **5** (2), 45-52.

The precipitin reaction with condensed and dialysed urine from 22 patients with chronic *Schistosoma japonicum* infections and serum from infected rabbits, was positive in all cases at titres of 1:4, in ten also at 1:8 and in one at 1:16. At the same time, the serum precipitin test with worm antigen was positive at dilutions of 1:800 to 1:3,200. There was no correlation in the titres of the two reactions. [For abstract of the author's work on the serum precipitin test see Helm. Abs., **23**, No. 837a.] After the treatment of five of the patients with TWSb, the urine precipitin reaction discontinued with the disappearance of eggs in the faeces (faecal tests were negative on examination 43 and 77 days after the treatment, the urine test was positive after 44 days only with undiluted urine and was always negative after 70 days); the serum precipitin test reaction, however, was still positive with a titre of 1:400 77 to 80 days after the treatment. In experiments with rabbits, the urine precipitin reaction appeared six days after their infection. Consequently, this reaction allows an early diagnosis of schistosomiasis and an assessment of the therapeutic effect of schistosomal drugs.

G. I. Pozniak

2273—OKUNO, K., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [Studies on *Ascaris* antigens. I.] **Acta Scholae Medicinalis in Gifu**, **7** (2), 561-572. [In Japanese: English summary p. 561.]

Various antigens from *Ascaris lumbricoides*, i.e. a body-cavity fluid, a K-antigen (extract of the worm body at 100°C. for one hour in a Koch sterilizer), an extract from the culture media and an extract from the body-wall, were injected intraperitoneally into rabbits. The precipitation test revealed that the production of antiserum in a rabbit was proportional to the total protein content of the antigen used. The precipitation reaction of the antiserum obtained from the intraperitoneal injections was generally R-type, while it was H-type when the antiserum of animals which had been intravenously injected was used.

Y. Yamao

- 2274—ONO, Y., KIMURA, S. & KUBA, N., 1959. [Institute of Veterinary Medicine, Hyogo Agricultural College, Sasayama, Japan.] [Über die Änderung der intradermalen Reaktion von Ono bei der experimentellen Fascioliasis des Rindes.] **Japanese Journal of Parasitology**, 8 (4), 527–531. [In Japanese: German summary p. 531.]

In two oxen, experimentally infected with *Fasciola hepatica*, Ono's intradermal reaction became positive after 12 days and 19 days respectively and it continued to be positive for more than one year. Reinfection intensified the skin reaction. Repeated injections of the antigen produced neither sensitization nor desensitization. Y. Yamao

- 2275—ROMAN, E., 1959. [Laboratoire de Parasitologie, Université de Lyon, France.] "Sur la résistance à la réinfestation des rats parasités par le nématode *Strongyloides ratti*." **Comptes Rendus des Séances de la Société de Biologie. Paris**, 153 (11), 1795–1798.

The author has performed experiments with *Strongyloides ratti* in young and adult rats in order to demonstrate the possibility of their developing a resistance to a second infection. Rats (either adult or young) show no difference in response to a second infection if given six to eight days following the first. In all cases a large number of adult intestinal worms are found and some larvae. Cortisone administered to adult animals does not alter the response. If, however, the second infection is not given until 24 days or more after the initial infection then progressively fewer adult worms are found, the number of larvae remaining constant.

K. R. Heath

- 2276—ROSS, J. G., ARMOUR, J. & LEE, R. P., 1960. [Federal Veterinary Research Laboratory, Vom, Nigeria.] "Further observations on the influence of genetical factors in resistance to helminthiasis in Nigerian zebu cattle." **Veterinary Record**, 72 (7), 119–122.

Further observations are reported by the authors on genetically controlled resistance in white Fulani zebu calves to helminthiasis. Calves, mostly half sibs to the calves previously reported as exhibiting resistance [for abstract see Helm Abs., 28, No. 72b], when compared with a susceptible group, showed lower faecal egg counts (*Haemonchus contortus*, *Cooperia* spp., and *Oesophagostomum* spp.) and greater weight gains. They also gave a much higher immunological response as measured by the complement fixation technique. Evidence is presented to suggest that the complement fixing antibody is present in the gamma-1 fraction of the serum globulins. The value of the serum albumin levels in assessing pathogenicity is discussed.

F. H. S. Roberts

- 2277—SADUN, E. H. & LIN, S. S., 1959. [Walter Reed Army Institute of Research, Washington 12, D.C., U.S.A.] "Observations on the humoral and cellular basis of resistance to *Schistosoma japonicum*." [Abstract.] **Journal of Parasitology**, 45 (4, Sect. 2), 16.

[The full account of this work appears in **J. Parasit.**, 45, 549–559. For abstract see Helm. Abs., 29, No. 1543.]

- 2278—SADUN, E. H., LIN, S. S. & WALTON, B. C., 1959. "Studies on the host parasite relationships to *Schistosoma japonicum*. III. The use of purified antigens in the diagnosis of infection in humans and experimental animals." **Military Medicine**, 124 (6), 428–436.

Five antigens from adult *Schistosoma japonicum* were compared by intradermal tests in humans and by complement fixation tests with sera from humans and experimentally infected rabbits. The antigens were: a relatively crude fat-free antigen (SC), a lipid-free borate buffer extraction (STP) an acid soluble protein fraction (SM), an acid insoluble but alkaline soluble protein fraction (SM-ins), and an antigen containing metabolic products of the worms (S-ex). Fraction SM seemed to give best results and was used, with a saline control, to investigate immune responses in humans. With this antigen it was found that the mean wheal size increased with age and regardless of sex of the individual. Persons with clinical symptoms showed significantly larger wheals than those without complaints attributable to schistosomiasis. There were some moderate cross reactions with other trematode infections but the test was consistently satisfactory in its indications. A very small number of individuals passing eggs gave negative dermal reactions, while many showed positive reactions though no eggs were present in the

stools. It was noted that one third of the cases could not be detected by a single faecal examination. Antigens SM and STP were more sensitive than SM-ins and S-ex in complement fixation tests with sera from infected rabbits. Sera from rabbits artificially immunized with SM, SC and S-ex antigens gave positive reactions. 30 out of 68 sera from treated individuals gave positive reactions with the SM antigen. However, three persons passing eggs gave negative results. These and other sera were positive with STP antigen. No positive reactions were obtained with schistosome-free individuals except in one case of leprosy infection.

J. E. D. Keeling

2279—SCHULZ, R., 1958. [Kazakh Scientific Research, Veterinary Institute, Alma-Ata, U.S.S.R.] "L'immunité contre les helminthoses. Ses bases théoriques et son importance pratique." **Bulletin de l'Office International des Epizooties**, 49 bis (11/12), 265–280. [Also in English pp. 281–296.] Schulz discusses immunity against helminthiases, its theoretical foundations and practical importance. He compares this immunity with that against other infections and mentions specific features which depend on the special morpho-physiological and biological characters of helminths.

N. Jones

2280—SOULSBY, E. J. L., 1959. [Department of Animal Pathology, University of Cambridge, England.] "The importance of the moulting period in the stimulation of immunity to helminths." **International Veterinary Congress (16th), Madrid**, May 21–27, 1959. Vol. 11, pp. 571–573.

Soulsby reviews his recent work on the importance of the second ecdysis of nematodes in stimulating immunity and the antigenic value of the exsheathing fluids of third-stage larvae. [For abstracts of the original accounts see *Helm. Abs.*, 26, No. 472b; 27, Nos. 37a & 321a; 28, No. 42d.]

G. I. Pozniak

2281—SOULSBY, E. J. L., 1960. [Department of Animal Pathology, University of Cambridge, U.K.] "Immunity to helminths—recent advances." **Veterinary Record**, 72 (17), 322–328.

In this paper, which was delivered as a Peter Wilson Bequest Lecture at the Royal (Dick) School of Veterinary Studies, Edinburgh, Soulsby emphasizes that the study of helminth immunity is concerned not simply with the interplay of antigen and antibody but with the interplay of a population of parasites on a population of animals and therefore embraces the whole complex field of host-parasite relationships, including genetic effects. Stress is also laid on the vast extent and wide-spread nature of losses due to helminthiasis in domestic animals and the importance of checking them. The author then goes on to discuss recent advances in knowledge of the mechanism of immunity with particular reference to the "self-cure" phenomenon, the effects of protection and the sources of "functional" antigens, and the significance in this connection of the process of moulting. In conclusion, he reviews some of the broader implications of immunity and points out the more important advantages and disadvantages of artificial immunization against helminthic diseases. All of the numerous examples cited refer to nematode infections. [This is a paper which particularly merits perusal in the original.]

J. M. Watson

2282—STEWART, D. F., 1959. [McMaster Animal Health Laboratory, C.S.I.R.O., Parramatta Road, Glebe, N.S.W., Australia.] "The immune reactions to nematode infestation." **International Veterinary Congress (16th), Madrid**, May 21–27, 1959. Vol. I, pp. 267–278. [French, German & Spanish summaries pp. 276–278.]

The literature relating to the mechanism of resistance of the hosts to various nematode infections is reviewed and discussed. The serological reactions which take place during self-cure of sheep infected with *Haemonchus contortus* or *Trichostrongylus colubriformis* have been studied by the author. Self-cure appears to be initiated by an antigenic stimulus from the third moult. The importance of studying the reactions produced by antisera derived from natural infections is emphasized, because the Ouchterlony agar-diffusion precipitin test with antisera produced by injection of rabbits with worm tissues failed to equal that produced by metabolic products or exsheathing fluid. [For abstracts of work already published by Stewart on this subject see *Helm. Abs.*, 19, Nos. 160a, 160b, 285a, 285b; 22, No. 14a; 24, No. 419c; 27, No. 47j; and 28, No. 42d.]

G. I. Pozniak

- 2283**—SUSUMI, S., KURAMOTO, T., ICHIHARA, TSUYOSHI & ICHIHARA, TSURUO, 1958. [Chemo-Sero Therapeutic Research Institute, Kumamoto, Japan.] [Studies on the rapid flocculation test for fascioliasis. 1. Investigation on the antigens and technique for the rapid flocculation test.] *Japanese Journal of Parasitology*, **7** (6), 666–673. [In Japanese: English summary pp. 672–673.]

An antigen emulsion was obtained by employing the cholesterol crystal which was sensitized with liquid antigen. The lipid antigen was extracted with absolute ethyl alcohol from the lyophilized mature *Fasciola hepatica*. With this antigen, the rapid flocculation test for fascioliasis was carried out on sheep serum. Setting the limit of a positive reaction at the antigen value of 1:37 or more, a reliable result was obtained. The antigen also showed positive reactions at the value of 1:8 or less, to the serum of human syphilis as well as to that of rabbits without parasites, but it was completely negative to the serum of human ancylostomiasis. Y. Yamao

- 2284**—TAKAHASHI, O., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [Studies on pinworm immunity. I. On *Aspiculuris tetraptera* antigen.] *Acta Scholae Medicinalis in Gifu*, **7** (1), 117–123. [In Japanese: English summary p. 117.]

Takahashi obtained an antiserum to *Aspiculuris tetraptera* by injecting *A. tetraptera* antigen intravenously three times into rabbits. Using this antiserum, the existence of common antigenicity amongst various helminths was tested. Only *Syphacia obvelata*, *Rhabditis* and *Enterobius vermicularis* showed cross reactions. Y. Yamao

- 2285**—TAKAHASHI, O., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [Studies on pinworm immunity. II. On the antigenicity of *Syphacia obvelata*.] *Acta Scholae Medicinalis in Gifu*, **7** (1), 124–129. [In Japanese: English summary p. 124.]

Takahashi obtained antiserum to *Syphacia obvelata*, which showed positive reactions up to 1:64 dilution, by injecting *S. obvelata* antigen intravenously three times into rabbits. Precipitation tests were carried out between this antiserum and the antigens obtained from *S. obvelata*, *Aspiculuris tetraptera*, *Rhabditis*, and human oxyurid. The existence of common antigenicity was confirmed between them. Y. Yamao

- 2286**—TANABE, N., 1959. [Clinical Department, Research Institute of Endemics, Nagasaki University, Nagasaki, Japan.] [Immuno-serological studies of filariasis. III. Cutaneous reaction and precipitin test with *Wuchereria* antigens and evidence of antigenicity of urine from filariasis patients.] *Endemic Diseases Bulletin of Nagasaki University*, **1** (1), 38–50. [In Japanese: English summary p. 50.]

The cutaneous reaction and precipitin test with three kinds of antigens prepared from *Wuchereria bancrofti* were carried out in 184 cases of filariasis bancrofti. It could be stated that the skin test and precipitin test with *Wuchereria*-antigens proved to be specific for filariasis as the tests showed no group reaction against infections with other parasites. Y. Yamao

- 2287**—TRAWINSKI, A., 1959. “Diagnostic à l’aide des méthodes séro-allergiques, des maladies parasitaires des moutons, provoquées par les vers.” *Bulletin de l’Office International des Epizooties*, **52**, 234–240. [English summary pp. 239–240.]

Echinococcal antigen, prepared from scoleces recovered from hydatid cysts, *Fasciola hepatica* antigen from whole flukes less the intestinal contents, and *Ascaris lumbricoides* and *Muellerius capillaris* antigens obtained from whole worms were all prepared by drying, powdering, diluting in 1% sodium chloride solution, refrigerating at 4°C. and filtering. Using these extracts, only with a modified percentage of saline, respective anti-sera were prepared from rabbits. 105 sheep, 48 of which had hydatid disease, were examined using precipitin and complement fixation reactions. The first reaction revealed 92% of the positive cases and the second 89.1%. Allergic intracutaneous reaction revealed 96% of the positive cases. In the case of fascioliasis of sheep and cows the precipitin reaction revealed 98.6% of cases, the complement fixation reaction 89.8% and the allergic reaction 84.9%. Examination of 215 sheep, most of which had intestinal and/or pulmonary nematode infections, revealed that serological reactions, with *Ascaris lumbricoides* antigen, showed 75.2% of the positive cases in the precipitin reaction, and 72.1% in the complement fixation reaction. The allergic reaction was positive in 78.2% of the cases. In the case of the extract of *Muellerius capillaris*, the precipitin reaction gave 87.3%, complement fixation 68.6% and the allergic reaction 83.6% of positive cases. Examination of 80 controls gave negative results in all cases. N. Jones

- 2288**—YAMAKAWA, S., 1959. [Department of Parasitology, Gifu Prefectural Medical School, Gifu, Japan.] [Studies on the whipworm. I. On the antigenicity of *Trichuris vulpis*.] *Acta Scholae Medicinalis in Gifu*, 7 (2), 557–560. [In Japanese: English summary p. 557.]
The antiserum obtained by immunizing rabbits with a whipworm body antigen, produced a precipitation titre of 1:512. The antigen was found to be composed of more than two component antigens.
Y. Yamao

Anthelmintics

See also Nos. 1596, 1598, 1599, 1606, 1607, 1612, 1628, 1634, 1644, 1645, 1646, 1648, 1654, 1659, 1660, 1664, 1667, 1670, 1674, 1675, 1677, 1679, 1681, 1682, 1684, 1685, 1686, 1688, 1695, 1706, 1708, 1711, 1713, 1714, 1716, 1718, 1722, 1726, 1727, 1728, 1729, 1738, 1740, 1741, 1742, 1743, 1746, 1747, 1748, 1752, 1753, 1754, 1755, 1762, 1765, 1767, 1773, 1784, 1792, 1795, 1798, 1799, 1800, 1810, 1821, 1825, 1827, 1828, 1848, 2039, 2215.

- 2289**—ARMOUR, J. & HART, J. A., 1960. [Federal Department of Veterinary Research, Vom, Nigeria.] "The anthelmintic efficiency of bephenium hydroxynaphthoate against the gastro-intestinal strongyles of Nigerian zebu cattle." *Veterinary Record*, 72 (16), 306–309.
Field trials and critical tests are described with bephenium hydroxynaphthoate against gastro-intestinal helminths in Nigerian zebu cattle. High efficiencies were obtained against *Cooperia* spp. and *Oesophagostomum radiatum* at dose rates of 125, 175, and 225 mg. per kg. body-weight, but against *Haemonchus* spp. only at 225 mg. per kg. In some animals the highest dose rate was also satisfactory against *Trichostrongylus* spp. but in others the results were poor.
F. H. S. Roberts

- 2290**—BAKER, N. F., ALLEN, P. H. & DOUGLAS, J. R., 1959. [University of California, School of Veterinary Medicine, Davis, California, U.S.A.] "Trial with a new organic phosphate as an anthelmintic in cattle." *American Journal of Veterinary Research*, 20 (75), 278–280.
Trolene, O-methyl-O-(4 tert. butyl-2-chlorophenyl) ethylphosphoramidothioate, an organophosphorus insecticide, was used in Hereford cattle to determine its effectiveness against naturally acquired helminthic infections. Treated animals were given 120 to 130 mg. per kg. body-weight (41 gm. active ingredient) by stomach tube and then slaughtered six days later. Abomasa and small intestines were examined for worms and differential counts of species made in both treated animals and untreated controls. Worm removal was as follows: *Trichostrongylus* spp. in abomasum and small intestine, 90–100%; *Cooperia* spp. in small intestine, 87%; *Ostertagia* spp. in small intestine, 66%. No anthelmintic effect was observed against *Fasciola hepatica*. In five of the ten animals the drug produced definite signs of toxicity including depression, myasthenia, diarrhoea, vomiting and miosis. Recovery in three to five days followed the administration of atropine intramuscularly. In spite of the toxic properties of this drug, its high efficiency warrants further investigation.
O. D. Standen

- 2291**—BANKS, A. W. & MITTON, R. L., 1960. [Institute of Medical and Veterinary Science, Adelaide, South Australia.] "Acute *Ostertagia ostertagi* infection in young cattle and its successful treatment with O,O-dimethyl 2,2,2-trichloro 1-hydroxymethyl phosphonate." *Veterinary Record*, 72 (13), 241–245.
Neguvon (Bayer) [O,O-dimethyl-1-hydroxy-2,2,2-trichloroethyl-phosphonate] at a dose rate of 80 mg. per kg. body-weight is reported as highly effective in controlling severe outbreaks of *Ostertagia ostertagi* in one to eleven-month-old calves on pastures in South Australia. Alarming symptoms of toxicity from the drug were seen shortly after treatment, but usually passed off spontaneously in a short time. These effects were rapidly reversed by atropine. The clinical and post-mortem appearances of animals affected by the parasite are described. The minimum number of *O. ostertagi* likely to be associated with serious disease in calves six to nine months old is estimated to be 50,000 to 80,000 and in calves one month old 10,000 to 20,000.
F. H. S. Roberts

2292—BARKE, A., 1959. [Untersuchungslaboratorium der Wirtschaftsgenossenschaft deutscher Tierärzte, Hannover.] "Zur Verträglichkeit des Cyanacethydrazid als Lungenwurmmittel." *Tierärztliche Umschau*, **14** (8), 268–271.

A report is made on the toxicity of cyanacethydrazide to mice, cats, dogs and pigs. A variation has been observed between the toxicity of freshly prepared solutions and discoloured solutions which were four months old. The LD_{50} for a 10 gm. mouse with a fresh solution was by the subcutaneous route 2.6 mg., by the intra-peritoneal route 2.5 mg. and by the intravenous route 2.3 mg. as compared with a four-month-old solution where the figures were 3.6 mg. for the subcutaneous route and 3.7 mg. for the intravenous route. The fatal dose in the cat was 75 mg. per kg. by the subcutaneous route and fluctuates between 57 and 70 mg. per kg. by the intravenous route in the dog. Pigs have been able to withstand doses up to 50 mg. per kg. subcutaneously without toxic symptoms. K. Heath

2293—DOLNIKOV, Y. Y., 1959. [A study of the anthelmintic efficacy of aerosols against dictyocauliasis of sheep. Note I. Testing of the anthelmintic action of smokes.] *Sbornik Nauchnikh Rabot Sibirskogo Nauchno-Issledovatel'skogo Veterinarnogo Instituta*, **8**, 209–211. [In Russian.]

Inhalation by sheep of an aerosol of ammonium chloride cleared the bronchi of thick mucus but was without anthelmintic effect against dictyocauliasis. The tolerated dosage was 3–5 gm. of the sublimated solid per cu.m., of air inhaled for 40 to 60 minutes. Such inhalation applied before treatment of sheep increased its efficacy by 12%. The other three aerosols tested, i.e. hexachlorethane, zinc chloride and crystalline iodine, had no effect. G. I. Pozniak

2294—FURMAGA, S., 1960. [Institut für Parasitologie und vet.-med. Zoologie der Tierärztliche Hochschule, Hannover.] "Untersuchungen über die Wirksamkeit von Neguvon auf Magen-Darm-strongylen der Schafe." *Berliner und Münchener Tierärztliche Wochenschrift*, **73** (10), 181–184. [English summary p. 184.]

Neguvon [O, O-dimethyl-1-hydroxy-2,2,2-trichloroethyl-phosphonate] was tested against gastro-intestinal parasites in 16 sheep; four untreated animals were used as controls. In doses of 50 mg. per kg. body-weight Neguvon was fully effective against *Haemonchus contortus* and in doses of 80 to 100 mg. per kg. showed a partial effect against *Oesophagostomum venulosum*, *Bunostomum trigonocephalum* and *Ostertagia*. Other strongyles were not affected. The 100 mg. dose produced toxic reactions in two out of four sheep. G. I. Pozniak

2295—GIBSON, T. E., 1960. [Central Veterinary Laboratory, Weybridge, Surrey, U.K.] "Controlled tests with four new anthelmintic substances against *Trichostrongylus axei* in sheep." *Veterinary Record*, **72** (18), 343–344.

The anthelmintics tested were: (i) bephenium embonate; (ii) bephenium hydroxynaphthoate; (iii) O,O-dimethyl-0-2,4,5-trichlorophenyl phosphorothioate (ronnel, Trolene or DOW ET-57); and (iv) O, O-dimethyl-1-hydroxy-2,2,2-trichloroethyl phosphonate (Neguvon or Bayer L13/59); (i) and (ii) as suspensions in water were given with a drenching gun at 250 mg. per kg. body-weight and were 56% and 74% efficient respectively against *Trichostrongylus axei*; (iii) was given at the rate of 100 mg. per kg. in gelatine capsules and (iv) was given at the rate of 100 mg. per kg. as a suspension. Both of the organic phosphorus compounds were ineffective. These are the results of three different experiments which varied in some details and Gibson states that they can only be taken as an indication of the approximate relative efficiency of the compounds tested, none of which was as effective as phenothiazine. P. L. Thomas

2296—GÜRALP, N., 1957. "Veteriner hekimlikte yeni antelmintikler." *Türk Veteriner Hekimleri Derneği Dergisi*, **27** (130/131), 3607–3614. [English summary p. 3613.]

New and more effective anthelmintics used against some internal parasites of domestic animals are discussed. Those mentioned are piperazine salts, toluene, cadmium and emetine hydrochloride. T. Öden

2297—HERNÁNDEZ VALLADOS, R., 1957. "Desparasitación intestinal masiva aplicada e programas de salubridad. I. Tetracloretileno." *Boletín Epidemiológico. Mexico*, **21** (4), 107–112.

969 persons with a high incidence of ascariasis, trichuriasis and hookworm infection were treated with tetrachlorethylene without purgative. The drug, in gelatin capsules of 0.5 c.c. to

1.0 c.c. each, was given every five minutes until the total dose of 0.1 c.c. per kg. body-weight was reached. The total dose did not, however, exceed 5 c.c. Faecal examination of 275 persons showed that the efficacy of the treatment was 71.5% against hookworm, 42.7% against ascariasis and 45.3% in the case of trichuriasis. Ascarids were expelled without any side effects other than those due to the anthelmintic itself. The main side effects were epigastric pain, headache and nausea. N. Jones

- 2298—ITO, R., TSUNODA, H., TSURUSAKI, T. & HAKUSHIKA, M., 1958. [Faculty of Agriculture, Yamaguchi University, Yamaguchi, Japan.] [Anti-emetic effect of hyoscine-N-butyl-bromide given with an anthelmintic.] *Journal of the Japan Veterinary Medical Association*, **11** (6), 252–253. [In Japanese.]

Hyoscine-N-butyl-bromide (Buscopan) 1 mg. per kg., injected into dogs 40–50 minutes before the administration of an anthelmintic, was proved effective in preventing vomiting. Y. Yamao

- 2299—MAZZOTTI, L., DÍAZ MUÑOZ, A. & BRISEÑO, C., 1957. [Instituto de Salubridad y Enfermedades Tropicales, Mexico.] “Conservación del extracto acuoso de semilla de calabaza, por medio del parahidrodibenzoato de metilo.” *Revista del Instituto de Salubridad y Enfermedades Tropicales. Mexico*, **17** (2), 61–64. [English summary p. 64.]

Aqueous extract of pumpkin seed, without the oil fraction, preserved its anthelmintic efficacy for at least one year as a result of the addition of two parts per thousand of methyl parahydrodibenzoate (Nipagin). The extract was kept at room temperature and the conclusion is based on the results of the treatment of 14 cases of taeniasis at different times after preparation of the extract. N. Jones

- 2300—MEHRA, P. N. & MITTAL, T. C., 1960. [Department of Pharmacognosy, Panjab University, Amritsar, India.] “Indian substitutes of male fern in pharmacognosy.” [Correspondence.] *Nature. London*, **186** (4726), 722–723.

18 indigenous ferns of the family Aspidiaceae have been examined and a key, based upon histological characteristics, is being prepared for the differentiation of species. Assays for filicin, carried out by the pharmacopoeial method, showed that 13 of the 14 species of *Dryopteris* examined and two species of *Ctenitis* contained more than the B.P. or U.S.P. requirement (1.5%) of the active principle. *D. chrysocoma* contained 4.3% of filicin and it is suggested that this and other species of *Dryopteris* which grow profusely in the Himalayas could be used as a substitute for imported male fern. [The pharmacopoeial assay depends upon extraction of the oleoresin with ether and separation of the fraction soluble in aqueous alkali. The alkaline solution is acidified; the filicin is extracted from it with chloroform, and weighed. It should be confirmed by biological assay that the substances extracted by the method from Indian ferns have anthelmintic activity comparable with that of the filicin extracted from *D. filix-mas*.]

L. G. Goodwin

- 2301—MELLO, D. & QUEIROZ, J. C., 1958. “A piperazina e seus derivados como anti-helmínticos em veterinária.” *Biologico. São Paulo*, **24** (6), 104–107.

This is a brief report of the use of piperazine and its salts in veterinary practice. Dosage of the piperazine base is approximately 1 gm. per 10 kg. live weight. W. K. Dunscombe

- 2302—OSHIO, Y., ITO, Y & IKEUCHI, M., 1958. [National Institute of Agricultural Science, Nishigahara, Tokyo, Japan.] [Studies on ovicides against *Ascaris lumbricoides* eggs.] *Bulletin of the National Institute of Agricultural Sciences, Tokyo. Series H. Farm Management and Land Utilization*, No. 22, pp. 123–130. [In Japanese: English summary p. 130.]

The ovicidal effect of a number of substances on eggs of *Ascaris lumbricoides* in water at 28°C. was in the following order: tolyl-, phenyl-, allyl-, benzyl-, butyl-mustard oil, phenyl mercuric acetate, carbon disulphide and benzothiazole. Tolyl-mustard oil, which was proved to be the most effective, prevented growth of *Ascaris* eggs in 1:50,000 dilution. *Ascaris* eggs in urine were more resistant to the ovicides than eggs in water. The ovicidal effect decreased greatly when the chemicals were applied at 2°C., but was not influenced by the presence or absence of the egg-shell. Y. Yamao

- 2303—RIEK, R. F. & KEITH, R. K., 1959. [Division of Animal Health and Production, C.S.I.R.O., Veterinary Parasitology Laboratory, Yeerongpilly, Queensland, Australia.] "Studies on anthelmintics for cattle: V. Other organic phosphorus compounds." *Australian Veterinary Journal*, **35** (9), 403–408.

The organic phosphorus compounds Asuntol and Dow ET-57 were highly effective against *Haemonchus placei*, *Cooperia punctata* and *C. pectinata* at a dose rate of 2.5 gm. and 5 gm. per 100 lb. body-weight respectively. There was variable efficiency against *Oesophagostomum radiatum* and little or no efficiency against the other species. No anthelmintic activity was shown by Diazinon, Chlorthion, Malathion and D.D.V.P. at the dose rates employed.

R. F. Riek

- 2304—SATO, T. ET AL., 1958. [Livestock Sanitary Service Centre of Mito, Yamaguchi, Japan.] [Anthelmintic effect and side reaction of hexachlorethane preparations.] *Journal of the Japan Veterinary Medical Association*, **11** (3), 135–137. [In Japanese.]

Hexachlorethane was administered, 120 gm. per head, to adult oxen by one of two methods, either the whole amount at one time or one half per day on two successive days. Faecal examination usually showed a reduction of eggs, but completely negative faeces were rarely found. Side effects occurred in 104 cases out of 216, but they were mostly very mild.

Y. Yamao

- 2305—SCHOOP, G. & LAMINA, J., 1959. [Institut für Zoonosenforschung, Johann-Wolfgang-Goethe-Universität, Frankfurt am Main, West Germany.] "Über die vermizide Wirkung von Neguvon auf *Trichinella spiralis* in experimentell infizierten Mäusen. Vorläufige Mitteilung." *Monatshefte für Tierheilkunde*, **11** (6), 167–171.

Four groups of mice freshly infected with *Trichinella* were treated with Neguvon [O,O-dimethyl-1-hydroxy-2,2,2-trichloroethyl-phosphonate]; the total dosages were: (i) 1,050 mg. per kg. body-weight in six oral applications; (ii) 700 mg. per kg. in four oral applications; (iii) 450 mg. per kg. in three intraperitoneal applications; and (iv) 375 mg. per kg. in three intravenous injections into the tail. 17 of the 20 mice treated were free of *Trichinella* larvae on examination after two months, two had died on infection and only one, which had bled profusely after injection, remained infected. All five controls showed medium strong infections.

G. I. Pozniak

- 2306—SELIVANOVA-YARTSEVA, A. S., 1959. [Garlic as a new anthelmintic against cestode infection in geese.] *Sbornik Nauchnikh Sibirskogo Nauchno-Issledovatel'skogo Veterinarnogo Instituta*, **8**, 197–199. [In Russian.]

A preliminary note on the efficacy of 1–3 gm. of garlic per kg. body-weight against *Drepanidotaenia lanceolata* in geese has already appeared in 1955 [for abstract see Helm. Abs., **24**, No. 308n]. Garlic gruel in the above dosage or as 2–7 ml. per kg. of a 1:5 dilution of the aqueous extract (8 gm. extracted with 20 ml. of boiling water for one to two hours), was not toxic to geese. The preliminary experiments leading to the above results were done on cestodes of cats and dogs. A 1:5 aqueous extract killed *Dipylidium caninum* within seconds and *Taenia hydatigena* within 1 to 20 minutes in experiments *in vitro*. No cestodes were found in cats three to four days after dosing with 30–50 gm. of garlic in 1:5, 1:10 or 1:20 dilutions of the extract.

G. I. Pozniak

- 2307—SEN, H. G., KELLEY, G. W. & OLSEN, L. S., 1960. [Department of Veterinary Science, University of Nebraska, Lincoln, Nebraska, U.S.A.] "Efficacy of cyanacethydrazide against *Metastrongylus* spp., lungworms in swine." *Journal of the American Veterinary Medical Association*, **136** (8), 366–368.

Pigs infected with *Metastrongylus* spp. were treated by subcutaneous injection on three successive days with doses of 16 mg. per kg. body-weight of cyanacethydrazide. It was shown to have only slight action against this parasite. In one trial many adult worms were dislodged

but in two succeeding trials no effects were seen. The egg counts of pigs treated with the drug 7, 21 and 42 days post-inoculation diminished more quickly than in control animals.

K. R. Heath

- 2308**—SENEVIRATNA, P., 1960. [Department of Veterinary Science, University of Ceylon, Peradeniya, Ceylon.] "Some recent developments in anthelmintics used in domestic animals." **Ceylon Veterinary Journal**, 8 (1), 17-19.

Seneviratna presents a concise review of the anthelmintic activity of bephenium compounds (bephenium embonate, bephenium hydroxynaphthoate and bephenium chloride) and organic phosphorus compounds (Neguvon or Dipterex, Dow-ET57 and Asuntol). He cites the helminth and host species concerned, curative and toxic dosage rates and the efficacy achieved.

G. I. Pozniak

- 2309**—SHANKER, A. & GULATI, J., 1960. [Ghandi Medical College, Bhopal, India.] "Purpura after administration of piperazine." **British Medical Journal**, Year 1960, 1 (5186), 1622.

- 2310**—SHARAF, A., AHMED, Z. F. & ABDEL MONEIM, F., 1959. [Pharmacology and Drug Research Unit, National Research Centre, Dokki, Egypt.] "In vitro study of the anthelmintic property of *Artemisia monosperma* grown in Egypt." [Correspondence.] **Nature. London**, 184 (4686) 647.

Aqueous and alcoholic extracts of the santonin-free *Artemisia monosperma* were tested *in vitro* against *Ascaris* (*Toxascaris*?) *leonina* either as whole or anterior preparations and against strips of dog small intestine. Addition of the extracts to the organ both depressed the movements of the intestine and greatly stimulated the movement of the ascarid preparations. The aqueous extract was more potent than the alcoholic. [The authors make the highly dubious claim that these observations indicate the presence of a potent anthelmintic and go even further to recommend the use of watery extracts followed by a purge one hour later for the removal of ascarids. The dangers of ascarid stimulation are well known. No pharmacological data are offered.]

O. D. Standen

- 2311**—TCHOUBABRIE, I. T., 1958. [Institut de Recherches de l'Elevage et de la Médecine Vétérinaire du Ministère de l'Agriculture de la R.S.S. de Géorgie.] "L'efficacité de l'arséniate d'étain contre la moniéziase et al thysaniéziase des ovins, l'ascaridiose et les cestodoses des poules." **Bulletin de l'Office International des Epizooties**, 49 bis (11/12), 633-639.

Monieziasis was treated in 352 lambs with 0.3 gm. to 0.4 gm. of tin arsenate per animal, given in gelatin capsules or tablets after 18 hours' fasting. On the day of treatment the animals did not receive either water or purgatives. Treatment was followed by a two to three hours' fast and by a period of partial fasting. Autopsies, 3 to 11 days after dosing, showed the treatment to have a 100% efficacy. Efficacy was lessened by reduction of the fasting period and when lambs received water on the day of treatment. For lambs three to six months old and 10 kg. to 28 kg. in weight the toxic dose was 2 gm. or more whereas the lethal dose was 3 gm. or over. Tchoubabrie discusses the results obtained by other authors with tin arsenate against ovine thysanieziasis and against ascaridiasis and cestodiasis in chickens. He has experimented with other arsenic compounds against helminthiasis in domestic animals and fowl and found manganese arsenate to be one of the best.

N. Jones

- 2312**—TOURATIER, L. & COMYN, P. M., 1959. "Réflexions sur l'utilisation de l'hydrazide de l'acide cyanacétique dans le traitement des bronchites vermineuses." **International Veterinary Congress (16th), Madrid**, May 21-27, 1959. Vol. II, pp. 579-580.

Touratier & Comyn, while quoting some literature on the efficacy of cyanacethydrazide against verminous bronchitis, recall an instance where one of them treated 150 bovines for metastrongyliasis. No significant results were obtained and at slaughter the lungs were still filled with live worms. However, the drug was well tolerated. Treatment with this drug should therefore be supplemented by some other anthelmintic.

N. Jones

- 2313**—WYSOCKI, E. & NASIŁOWSKA, M., 1959. [Laboratorium Technologiczne Dezynfekcji, Dezynsekcji, Deratyzacji, Ministerstwo Zdrowia, Warszawa, Poland.] "Wpływ niektórych pochodnych fenolu na ja ja *Ascaris lumbricoides*." **Wiadomości Parazytologiczne**. Warsaw, 5 (6), 569-575. [English summary p. 575.]

Wysocki & Nasiłowska tested the efficacy of some phenol derivatives at 0.5% concentration in water against *Ascaris lumbricoides* eggs. The development of control eggs as well as that of experimental eggs was studied in isotonic saline solution. The eggs were placed in the solutions for one to 15 days and the results were compared with those with 1% phenol solution. 2,2'-dihydroxy-3,3'-5,5'-6,6'-hexachlorodiphenylmethane, and 5,3'-dichloro-4'-chloroanilide of salicylic acid and their sodium salts were found to be ineffective. 2,4-dichlorophenol destroyed the eggs after two days' contact. A similar but weaker effect was obtained with 2,5-dichlorophenol. The effect of 2,4,5-trichlorophenol was relatively weak. N. Jones

Economic Aspects

See also Nos.: 1725, 1727, 1753.

- 2314**—BORCHERT, A. & JUNGSMANN, R., 1959. [Institut für Veterinärmedizinische Parasitologie, Humboldt-Universität, Berlin.] "Über die bei unseren Haustieren ausgelösten Verluste durch Parasiten." **Monatshefte für Veterinärmedizin**, 14 (8), 231-237.

Increased live-stock breeding leading to greater productivity is planned for East Germany. The authors point out that an important factor in higher meat and milk production is the control of parasitic infections and evaluate the losses suffered in various districts due to liver-fluke, *Echinococcus*, *Cysticercus* and other infections. For example, in the Berlin abattoir during the years 1955-57, 30,983 cattle and sheep livers were rejected because of liver-fluke infection and 24,266 cattle and pig livers because of hydatid giving a loss of 1,900,000 DM (German marks). In the Cottbus district the annual losses due to liver-fluke equal 20,000 tons of beef and 320 million litres of milk. Thus the German Insurance Institution estimates that, for sheep alone, the total damage done by the liver-fluke and intestinal and pulmonary nematodes costs East Germany about 10 million DM yearly. G. I. Pozniak

- 2315**—KEULEN, A. VAN, 1959. "Cysticercose en vleeskeuring. I." **Tijdschrift voor Diergeneeskunde**, 84 (10), 526-536. [English, French & German summaries p. 536. Discussion p. 548.]

Keulen reports that the incidence of *Cysticercus bovis* in cattle slaughtered in the Netherlands has steadily increased from 0.31% in 1950 to 0.55% in 1957, and that the financial loss from infected cattle, over the same period, has risen from 250,000 to one million guilders. An epidemiological study of 458 infected farms in all parts of the Netherlands carried out in 1956 and 1957 revealed that in 9% the human carriers could be identified, in 58% infection was from carriers not identified, and in 33% the source of infection was not discovered. The public health aspects of the infection are discussed. In the Netherlands a joint medical and veterinary committee has been set up to survey the whole problem. A. E. Fountain

- 2316**—SMITH, A. L., 1959. [United States Department of Agriculture, Crops Research Division, Alabama Polytechnic Institute, Agricultural Experiment Station, Auburn, Alabama, U.S.A.] "Progress with problems in cotton disease control." **Plant Disease Reporter**. Supplement 259, pp. 199-204.

During the period 1952 to 1957 it is estimated that the root-knot nematode (*Meloidogyne* spp.) was responsible for a 1.05% reduction in the total U.S.A. cotton yield, representing a loss valued at thirty-five million dollars. Losses due to root-knot were most severe, and constituted a major problem, in the south-eastern cotton growing region (Alabama, Georgia, North and South Carolina). In this region losses were estimated at 2.22% of the crop. Root-knot resistance found in wild types of cotton is polygenic and recessive and will be difficult to transfer to commercial types. D. J. Hooper

History

See also Nos.: 1593, 1848.

- 2317**—CERQUEIRA FALCÃO, E. DE, 1959. [C. Postal 796, Santos, São Paulo, Brazil.] "Pirajá da Silva, o incontestável descobridor do *Schistosoma mansoni*." Santos, São Paulo, 314 pp. The title of this volume is that of a 15-page Portuguese version of an article published in English by Falcão four months previously in *Z. Tropenmed. u. Parasit.*, **10**, 146–153, and reproduced later in the volume. The remaining pages of Part I are devoted to a bio-bibliographical account of Pirajá da Silva's career, illustrated by facsimiles of many certificates and handwritten documents including an unfinished article on "An epidemic of priapism due to vesicant insects" found by Falcão among Pirajá da Silva's files. The second part of the volume is taken up with facsimiles of non-helminthological publications contributed by Pirajá da Silva between 1908 and 1912. The third part describes the commemorative ceremonies held in São Paulo and Bahia and the presentation by the Brazilian Minister of Health in 1958 of a bronze medal in honour of Pirajá da Silva's discovery of the occurrence of *Schistosoma mansoni* in Brazil. An article on Pirajá da Silva's investigations on *S. mansoni*, written by Falcão for the World and Science section of *Folha da Manhã*, in December 1958 is reproduced and is followed by copies of personal letters on various non-helminthological topics received by Pirajá da Silva from Afrânio do Amaral. The volume closes with a facsimile copy of Opinion 226 rendered by the International Commission on Zoological Nomenclature validating the generic name *Schistosoma* Weinland, 1858 and suppressing *Bilharzia* Meckel von Hemsbach, 1856.
R. T. Leiper

- 2318**—KOPIRIN, A. V., 1959. [The developments and achievements in Russian veterinary helminthology in Siberia and the Urals.] *Sbornik Nauchnikh Rabot Sibirskogo Nauchno-Issledovatel'skogo Veterinarnogo Instituta*, **8**, 161–168. [In Russian.] The paper traces the development of helminthology in Siberia and the Urals since the revolution and quotes the work done there, naming the investigators and the subjects studied.
G. I. Pozniak

- 2319**—MARKEVICH, A. P., 1959. [Zoological Institute of the Academy of Sciences, Ukrainian S.S.R., Kiev.] "Development of zoological phylogenetics in the USSR." *Věstník Československé Zoologické Společnosti*, **23** (3), 211–229. Markevich, discusses the development and reviews the literature of animal phylogenetics in Russia and mentions, *inter alia*, the phylogeny of helminths and leeches and some features of their classification.
N. Jones

Biography

- 2320**—[POLUSZYŃSKI, G.], 1959. [Katedra Parazytologii i Chorób Inwazyjnych, Wydział Weterynaryjny, Wyższa Szkoła Rolnicza, Wrocław, Poland.] "Professor Dr. Gustaw Poluszyński (15.IX.1887–12.II.1959)." *Wiadomości Parazytologiczne*. Warsaw, **5** (6), 501–508. In this obituary of Professor G. Poluszyński, founder of the Polish Parasitological Society, an account is given of his parasitological work, including some researches on strongylid larvae.
N. Jones

Hyperparasitism

No relevant abstracts in this issue.

Evolution

See also Nos.: 1864, 2319, 2331, 2332.

2321—GAMBINO, J. J. & HEYNEMAN, D., 1960. [University of California, Los Angeles, California, U.S.A.] "Specificity and speciation in the genus *Cyrtosomum* (Nematoda: Atractidae)." **American Midland Naturalist**, **63** (2), 365–382.

Gambino & Heyneman studied four species of *Cyrtosomum*, namely, *C. scelopori* Gedoelst, 1919, *C. penneri* Gambino, 1957, *C. readi* Gambino, 1958, and *C. heynemani* Gambino, 1958. From the analysis of the ratios of the spicule and body measurements, the lip patterns, the distribution of the caudal papillae, the parasite distribution and the host specificity of the species, they conclude that *C. scelopori* is the oldest species and that the other three are more recent. The species, except *C. scelopori*, show a high degree of host specificity in being restricted to closely related taxonomic groups and this specificity appears to be physiological rather than ecological.

W. G. Inglis

2322—GINETSINSKAYA, T. A., 1957. [Adaptations of parasitic worms which live in the tissues and enclosed cavities of the host, to the discharge of eggs and embryos to the exterior.] **Vestnik Leningradskogo Universiteta. Seriya Biologii**, **12** (9), 53–57. [In Russian: English summary pp. 56–57.]

Ginetsinskaya briefly considers, quoting numerous examples, the various ways in which different helminths, living enclosed within tissues and cavities of the host, have adapted themselves in the discharge of eggs and larvae to the exterior.

G. I. Pozniak

2323—GOLVAN, Y. J., 1959. "Protonéphridies et taxonomie des Acanthocéphales." **International Congress of Zoology (15th), London**, July 16–23, 1958. Proceedings p. 960.

Golvan draws attention to the fact that Acanthocephala parasitizing homothermous vertebrates possess protonephridia whereas those species parasitizing poikilothermous vertebrates do not have these organs. He points out that, since structures lost during evolution cannot, as far as is known, be regained, the former group of parasites, which stand closest to the ancestral type, cannot be derived from the latter group. The importance of recognizing these facts in dealing with the taxonomy of the Acanthocephala is stressed.

I. Williams

2324—KERSHAW, W., 1959. "Evolution of host-parasite relationships." **Nature. London**, **184** (4689), 760–763.

The evolution of host-parasite relationships was discussed at a symposium of the Zoology Section of the British Association at its York meeting. Different ecological factors responsible for host specificity and the evolution of parasites were taken into consideration. At one point it was observed that biochemical approach to species determination should be encouraged and that isolated protein and carbohydrate fractions from hosts and parasites might be used in such investigations.

N. Jones

Miscellaneous

See also Nos. 1854, 2332.

2325—DOLLFUS, R. P., 1958. "Copépodes, isopodes et helminthes parasites de céphalopodes de la Méditerranée et de l'Atlantique Européen." In: "Faune marine des Pyrénées-Orientales.", Fasc. 1, pp. 61–72. **Paris: Hermann et Cie.**

Dollfus gives a list of helminths parasitic in cephalopods of the Mediterranean and Atlantic coastal waters of Europe.

N. Jones

2326—FLÜCKIGER, G., 1957. "Untersuchung über die Ausbreitung der Maul- und Klauenseuche, der Trichinose und der chronischen Erkrankung der Atmungsorgane des Geflügels." **Schweizer Archiv für Tierheilkunde**, **99** (10), 606–611.

The International Animal Diseases Service (Internationales Tierseuchenamt) held an inquiry by questionnaire in 84 countries into trichinellosis of man and pig, chronic pulmonary infections of poultry, and foot-and-mouth disease. For trichinellosis, brief notes are given on the occurrence and infection regulations in 14 European countries, while Belgium, Denmark, France, Holland, Switzerland and Luxembourg are reported as entirely free of this infection.

G. I. Pozniak

2327—GINSBERG, A., 1959. "Problems affecting meat hygiene in under-developed countries." **International Veterinary Congress (16th), Madrid, May 21-27, 1959.** Vol. II, pp. 757-759. Ginsberg emphasizes the patience and persistence required by advocates of hygiene, especially as it affects meat inspection, in under-developed countries to overcome the many problems presented by the general lack of hygiene facilities, funds and trained personnel and, particularly, by the deep-rooted local customs and superstitions. G. I. Pozniak

2328—GREENBERG, A. E. & DEAN, B. H., 1958. [Divisions of Laboratories and Preventive Medical Services, California State Department of Public Health, Berkeley, California.] "The beef tapeworm, measly beef, and sewage—a review." **Sewage and Industrial Wastes, 30** (3), 262-269.

2329—JIROVEC, O., 1958. [Parasitological Department, Charles University, Prague, Czechoslovakia.] "Achievements and perspectives of human parasitology in Czechoslovakia." **Bulletin of the Calcutta School of Tropical Medicine, 6** (2), 75-79.

Jirovec reviews the development, present state and problems of human parasitology in Czechoslovakia. The most wide-spread helminths are *Enterobius*, affecting 30-100% of the population, and *Trichuris*, affecting 3-50% of children. *Ascaris* is infrequent in Bohemia and Moravia but has an average rate of infection of 20% in Slovakia. Occasional endemic outbreaks of trichinelliasis are known and a reservoir of this infection has been established in wild carnivores. In recent years, *Taenia solium* infection has fallen, but *T. saginata* is slightly increasing and *Hymenolepis nana* has spread among children's institutions and the child population. *Bothriocephalus* and *Echinococcus* are rare. *Strongyloides* occurs occasionally but is of no consequence, while ancylostomiasis is now absent. G. I. Pozniak

2330—SCHMIDT-HOENSDORF, F. & HÖRNING, B., 1959. [Berlin-Zehlendorf, Onkel-Tom-Strasse 144.] "Stand der Parasitologie in Polen." **Praktische Tierarzt (Der)**, Year 1959, No. 3, pp. 88-90.

This is a report on the sixth Congress of the Polish Parasitological Society held in Lublin in 1958, written by German workers who were present. G. I. Pozniak

2331—STEFAŃSKI, W., 1959. "Helminthes et infection." **International Veterinary Congress (16th), Madrid, May 21-27, 1959.** Vol. II, pp. 561-563.

Stefański recalls some of his own studies as well as those of other authors concerning the inter-relations between helminths and microbes. He refers to personal experiments involving *Strongyloides papillosus* and *Erysipelothrix rhusiopathiae* [for abstract see Helm. Abs., 25, No. 330d] and to some unpublished experiments which led him to conclude that a distinct bacteriostatic action is exercised by *Ascaris suum* on Gram-positive bacteria. This, however, plays only a secondary role in producing the host's resistance, the origin of which should be sought in the relations which are established in the course of evolution between the parasite and the host. N. Jones

2332—VITTOZ, R., 1958. "Evolution régionale des maladies parasitaires des animaux en Asie. Rôle du climat." **Bulletin de l'Office International des Épidémiologies, 49** bis (11/12), 493-525.

After an introductory note summarizing briefly parasitological problems in general and the history of parasitology in Asia, Vittoz discusses in the first part of his paper, the economic importance of parasitic diseases of animals in Asia and reviews the geographical distribution of livestock. In the second part, under the heading of "Parasitic regionalism in Asia", are given : (i) zonal distribution of animals from the zootechnical point of view with parasitic zones proposed in accordance with the animal zones; (ii) regional distribution of individual parasite species. In the third part the author reviews : (i) principal classifications of climates; (ii) climatic formulae; (iii) ecological types of climates; (iv) climatic influence on various parasites with a mention of this influence on the definitive and intermediate hosts; and (v) influence of climatic factors on parasitism. In the fourth part of this paper the author stresses the importance of ecological parasitology and prophylaxis. N. Jones

NEWS AND NOTES

† Thirteenth World Health Assembly

AT THE THIRTEENTH WORLD HEALTH ASSEMBLY, which was held in Geneva from 3rd to 20th May, 1960, delegates were given the opportunity to express the views of their governments on the policy and achievements of the Organization and to report on public health developments in their respective countries during the discussion on the report of the Director-General for 1959. Helminthic diseases which received particular attention were the filariases and schistosomiasis.

The importance of establishing centres for research on onchocerciasis, the need for further investigations on vector biology, ocular pathogenicity and treatment, and the wide-spread occurrence and serious nature of the ravages caused by this disease were stressed by the delegates of Guatemala, the United Kingdom, France, Belgium and several African countries and territories. In Guatemala this infection discourages settlement of potentially fertile districts; in Sudan it has caused desertion of whole areas by the population; in the Federation of Mali 90% of the population in certain villages is affected; while in some villages of the Republic of Upper Volta a third of the inhabitants are blind as a result of the disease.

The delegates of China (Taiwan) and Malaya expressed the hope that WHO would give more attention to filariasis. The Indian health authorities are also much concerned with this disease.

On behalf of WHO it was stated by Dr. P. M. Kaul, Assistant Director-General, that large-scale campaigns against onchocerciasis and filariasis are not practicable for the Organization at the moment, since much more information is needed on these diseases for their effective control. However, investigations have been sponsored by WHO to ascertain why onchocerciasis produces blindness in some cases and not in others, and further research and field studies in connection with the disease are included in the 1961 programme. It was announced by the WHO Regional Director for Africa that a second regional conference on onchocerciasis has been planned for 1961.

Further research on schistosomiasis was urged by the delegates of Iraq, the United Kingdom and Nigeria. Schistosomiasis in Iraq is still a major problem, none of the methods tried so far having produced satisfactory control of snails and interruption of transmission. New irrigation projects, in Iraq and elsewhere, were increasing the possibility that the disease might spread, while the ultimate solution of the problem by environmental sanitation and control would take long to achieve. Representatives of two

new African republics spoke of the extent and severity of schistosomiasis in their countries. In the Federation of Mali the disease affects 15.1% of children between 1 and 4 years of age, 47.2% of children of school age, and 25.5% of adults; while in the Republic of Upper Volta more than 90% of the children in certain areas are infected.

† WHO and Schistosomiasis

IN HIS LATEST ANNUAL REPORT on the activities of the World Health Organization, the Director-General, Dr. M. G. Candau, states that work against schistosomiasis in 1959 concentrated on two major problems. On the one hand, a survey was started to determine how far the efficiency of molluscicides depends on such factors as climate, sunlight, topography and quality of water; while on the other hand, a team visited ten countries in the Eastern Mediterranean and African Regions to study ways of preventing the disease in newly irrigated areas, with particular reference to the construction of canals and the improvement of agricultural practices.

International Society of Parasitologists

THE POLISH PARASITOLOGICAL SOCIETY, which has now been in existence for over twelve years, has taken the lead in proposing the creation of an International Society of Parasitologists. Questionnaires on the subject have been distributed to parasitologists throughout the world, the results of which are being evaluated as they are returned. It has been suggested that an international organizing committee should be formed to make arrangements for the holding of a First International Congress of Parasitology, probably in June, 1962, in some convenient European centre; to prepare a draft constitution for the consideration of this Congress and to put forward suggestions for the activities and finance of the Society. The main aims of the Society would be to organize quinquennial international parasitological congresses; to promote collaboration between parasitologists in all parts of the world; to initiate support and organize exchange of personnel, materials and information; to maintain contact with international organizations on the one hand and local organizations on the other; to assume protection of international groups of specialists in particular fields of parasitology; to maintain a world index of parasitologists; and to arrange for the publication of such a periodical or periodicals as may be considered appropriate. Further information and copies of the questionnaire may be obtained from: Societas Parasitologorum Polona, Wrocław, C. Norwida 29, Poland.

† Items so marked are due to the courtesy of the World Health Organization.

New Nematology Laboratory in U.K.

A NEW NEMATOTOLOGY LABORATORY for the Imperial College of Science and Technology (University of London) which is being built and equipped at the College Field Station at Silwood Park, Nr. Ascot, Berkshire, at a cost of £30,000, will be the first university laboratory in the Commonwealth specifically staffed and equipped for research and training in this subject at post-graduate level. The Shell International Chemical Company, because of its world-wide interest in agricultural chemicals is contributing £15,000 towards the cost of the project which is now nearing completion. Under Professor B. G. Peters, who was appointed to a new Chair of Parasitology at Imperial College in 1955, work on this subject has been developing, and a full-time one-year course in nematology was started in 1958.

Helminth-Virus Syndrome Paralyzes Settlements

AN EPIDEMIC INFECTION which occurred rather widely in Northern Manitoba last winter nearly wiped out the sledge dog population in the settlements at Nelson House and South Indian Lake, causing serious economic hardship. The majority of the Indians living in the area depend upon trapping and hunting for their livelihood and have no other means of transportation than the dogs. The outbreak was reported to the Federal Department of Agriculture and Dr. N. Mongeau, of the Health of Animals Division at The Pas, flew up to investigate. All the affected animals had been fed raw fish; and the course of the disease from onset of symptoms was in most cases very rapid, death ensuing within two to three days. Post-mortem examination revealed that the dogs had been simultaneously suffering from acute infectious canine hepatitis and a severe hepatic trematode infection. The parasite was tentatively identified as *Metorchis conjunctus*. Dr. Mongeau is at present looking into the relationship between the helminth and virus infections and studying the pathology and epidemiology of the syndrome.

†African Symposium on Schistosomiasis

THE WHO REGIONAL OFFICE for Africa and the CCTA jointly convened a meeting on schistosomiasis at Lourenço Marques, Mozambique, from 30th March to 8th April, 1960, which was attended by 28 technical representatives of 19 countries, with WHO staff and consultants. The terms of reference for this second meeting on schistosomiasis in Africa were intentionally confined to (1) assessment of the medical and public health importance of the disease, (2) control of intermediate snail hosts by chemical means, (3) prevention of spread and transmission through water management and agricultural practices, and (4) organizational status of control and research in Africa.

The importance of schistosomiasis, which is widely prevalent in Africa and is increasing as a

side effect of economic development, was considered. Morbidity caused was assessed in the light of a new concept, namely, by considering severe damage to the individual in the form of permanent and irreversible lesions instead of by looking at transient effects which might be minimized. The meeting stressed significance of the infection in its early stage of invasion, in established infection, and in its irreversible consequences. Principles and methods for a quantitative assessment of morbidity and disability were formulated.

Although in schistosomiasis the parts played by health education, sanitation and mass treatment campaigns are recognized, the group stated that at the present time mollusciciding offered the most efficient single method of control. A comprehensive review of the relative value of classical molluscicides, such as copper sulphate and pentachlorophenate, and of promising new compounds, such as Bayer 73 and Aqualin, was reported and procedures for molluscicides application and methods for their correct use were advocated.

Regarding the prevention of the spread of schistosomiasis in relation to water management and agricultural practices, the meeting summarized knowledge on the relationship between the ecology of snail habitats and engineering measures which should be advised in prevention, and emphasis was placed on co-operation in planning and implementing water resources programmes in connection with disease and vector control.

The report of this meeting contains the results of work and surveys made in the African region by WHO consultants and country participants, and constructive opinions are expressed on the importance of damage caused by bilharziasis to a community. Practical procedures for snail control through the use of chemicals or by engineering methods are advised.

American Society of Nematology

THE RESULTS OF THE QUESTIONNAIRE issued in connection with the suggested establishment of an American Society of Nematology have now been evaluated. A substantial majority were in favour of the formation of such a new society and preliminary action in accordance with this decision is now being taken. A draft constitution is being prepared and the possibility of affiliation with the American Institute of Biological Sciences is being explored. The name of the proposed society has not yet been definitely selected.

Experimental Parasitology

THE CHAIRMAN OF THE EDITORIAL BOARD—Dr. D. R. Lincicome—has announced that, in order to increase space and reduce publication lag the journal will publish two volumes annually, instead of only one. The new scheme begins this year.

Nematology Information Service

IT HAD BEEN PLANNED to allocate one issue per year of *Nematology News Letter* to a Nematology Information Service (NIS) Bulletin which should contain titles of publications in nematology recorded during the preceding calendar year, names and addresses of nematologists, and brief statements regarding their research interests. However, the responsibility for a bibliographical service in nematology has been accepted by the Nematology Section, Crops Research Division, United States Department of Agriculture, Beltsville, Maryland. The responsibility for the directory of nematologists remains with NNL. The first issue appeared with the June number and comprised upwards of 500 names. Nematologists are urged to co-operate by sending information about themselves to the Editor, NNL, Department of Plant Pathology, University of Arkansas, Fayetteville, Arkansas, U.S.A.

Reporting of Zoonoses in the Americas

IN A RECENT REPORT prepared by Drs. R. R. Puffer and E. C. Chamberlayne for the Advisory Committee on Tropical Medicine, United States National Academy of Sciences—National Research Council, stress is laid on the usefulness of combining reports of human and animal cases. Figures are quoted for cases of hydatid disease in man and animals recorded in Argentina and Chile. During the triennium 1956 through 1958 423 cases were reported in man and 1,088,878 in animals in the former country, whilst the corresponding figures for the latter country were 360 and 296, 206. As slaughter-houses were the chief source of the figures for cases in animals, they probably represent only part of the actual number. Though the number of human cases is small, it is pointed out that the high proportion of deaths shows that the disease is a veterinary health problem warranting preventive measures.

Zoonoses Centre

A NEW CENTRE for Zoonoses Research was opened at the University of Illinois in September 1960. The Centre, which is the first of its kind in North America, provides research facilities and is manned by a resident staff supported by consulting personnel from the World Health Organization, the United States Public Health Service and the Department of Agriculture, the Illinois State Departments of Health and Agriculture and the University's own College of Medicine. Director of the new Centre is Dr. Carl A. Brandly, Dean of the College of Veterinary Medicine in the University of Illinois.

Zoonoses Research

THE NEW INTERNATIONAL JOURNAL *Zoonoses Research* will include original papers and reviews on every aspect of research on the epidemiology of zoonotic diseases, including schistosomiasis and trichinellosis. The Editor is Dr. R. M. Ryan of the University of California; and members of the editorial advisory board are Sir F. MacFarlane Burnett (Melbourne), Dr. P. Galindo (Panama), Dr. J. F. Maldonado (San Juan) and Dr. P. C. C. Garnham (London). The subscription price will be \$9.00 per volume of approximately 400 pages. Orders should be sent to the publishers, Lyceum Press, 507, Fifth Avenue, New York 17, N.Y.

United States Department of Agriculture Nematode Collection

AN EXTENSIVE COLLECTION of plant nematodes is being established in the Section of Nematology, Plant Industry Station, Beltsville, Maryland, in connection with the taxonomic programme there. The collection is to serve as a permanent repository for nematodes which can be used both for reference and active taxonomic study. It will comprise a type collection, a general collection consisting eventually of all available plant-parasitic nematode species from various hosts and different geographical areas; and a small demonstration collection showing symptoms and pathogenic effects of nematodes on plants. The extensive material accumulated at the Beltsville Station by Dr. Cobb and Dr. Steiner will eventually be incorporated into the Collection. The work is in the charge of Dr. M. A. Golden.

†Sidelight on Helminthiasis

IT WAS RECENTLY STATED by an American medical observer that the parasitic helminths infecting the people of certain semi-tropical countries metabolize more of the produce of those countries than do the inhabitants; and half the work of the sick peasant population is thus put into the cultivation of food for the very worms that make them sick.

Schistosomiasis Control in China

IT IS REPORTED FROM CHINA that during the last four years the number of persons suffering from schistosomiasis japonica has been reduced by intensive mass treatment from 7 million to just over 3½ million and the snail host so extensively eradicated particularly in the twelve endemic provinces bordering on and south of the Yangtze River, that the risk of reinfection has been greatly reduced. An area of abandoned wasteland in Kiangnan which was hyperendemic for schistosomiasis and seasonally flooded by the Yangtze River has been reclaimed by the building of a large dyke.

REPORTS OF MEETINGS

American Phytopathological Society

THE 52ND ANNUAL MEETING of the American Phytopathological Society was held from the 28th to the 31st of August, 1960 inclusive at the American Baptist Assembly, Green Lake, Wisconsin. Three sessions concerned with plant nematology were held on 29th and 30th August and a total of 31 contributed papers was read. A nematology discussion meeting was held in the evening of August the 28th.

Midwestern Parasitologists

THE 12TH ANNUAL MIDWESTERN CONFERENCE of Parasitologists was held at Purdue University, Lafayette, Indiana, U.S.A., on 15th and 16th June, 1960. The highlight of the Conference was an evening address by Dr. Paul Weinstein on "Aspects of growth and differentiation of parasitic helminths *in vitro* and *in vivo*".

American Association of Veterinary Parasitologists

THE 5TH ANNUAL MEETING of the American Association of Veterinary Parasitologists was held at the Denver-Hilton Hotel, Denver, Colorado, on August the 14th, 1960. The programme was devoted to methodology in anti-parasitic research.

PROGRAMMES AND PERSONNEL

Dr. D. B. McMullen

OF THE Walter Reed Army Medical Centre, Washington, D.C. and now on a three-year assignment as Leader, World Health Organization Schistosomiasis Advisory Team, is at present on home leave in the United States. He is scheduled to return to WHO headquarters in Geneva in January.

† Dr. Y. Komiya

CHIEF, Department of Parasitology, National Institute of Health, Tokyo, has been appointed WHO consultant for a survey for the newly discovered endemic foci of schistosomiasis japonica in the Mekong river valley, Laos, and in the district of Chawang in Southern Thailand. The first autochthonous infection with *Schistosoma japonicum* in south-east Asia was reported in 1957 in the Mekong river valley, Laos, near the border of Thailand. A second case was reported in a patient from the district of Chawang in Southern Thailand in 1957, and a survey in a nearby village early in 1960 revealed about 200 cases of bilharziasis japonica. The significance of these findings cannot be over-emphasized. For the first time endemic foci of the most dangerous of the three human schistosomes have been found in an area formerly thought to be free of the infection. Also the two foci are widely separated and in entirely different hydrographic basins. It is apparent that additional foci may occur in south-east Asia and that public health and medical authorities should be on the alert. The discovery of the parasite in the Mekong river basin is of particular importance, since extensive plans are being made for the development of the water and soil resources of the area. Dr. Komiya will investigate the epidemiological aspects of transmission, search for the molluscan intermediate host and attempt to infect laboratory animals with the parasite from the area. His

survey should help those responsible for economic developments in the areas concerned by providing a basis for incorporating snail control and other preventive measures into their plans.

† Dr. R. A. Torrico

FORMER CHIEF of Parasitology and Tropical Diseases in the Institute of Regional Medicine of the University of North West Argentina, has been appointed by the WHO Regional Office for the Eastern Mediterranean as team leader to the schistosomiasis control project in Iraq. Dr. Torrico has also served as Director of the Laboratory of Inter-American Co-operative Health Services in Cochabamba, Bolivia, for thirteen years, and as Professor of Parasitology and Tropical Medicine at the University of San Simon, Cochabamba.

Recent Overseas Visitors to the Bureau

INCLUDED Dr. R. J. Pitchford, South African Council for Scientific and Industrial Research, Bilharzia Field Unit, Nelspruit, Eastern Transvaal; Dr. Zahir Ahmed, Institute of Hygiene, University of Bonn, Western Germany; Dr. Alan Mozley, Union College, Schenectady, N.Y., U.S.A.; Dr. P. H. Brown, Veterinary Department, Maseru, Basutoland.

Dr. D. M. Blair

SECRETARY FOR HEALTH, Federation of Rhodesia and Nyasaland, paid a short visit to the United Kingdom last summer in order to attend the British Commonwealth Scientific Conference and the Royal Society Tercentenary Celebrations.

Mr. K. C. Bremner

RESEARCH OFFICER, Veterinary Parasitology Laboratory, Yeerongpilly, Queensland, Australia, is spending a year in the United Kingdom in order to carry out investigations of the pathogenesis of parasitic gastro-enteritis at the School

of Veterinary Medicine, University of Cambridge. Mr. Bremner is scheduled to return to Australia in August, 1961.

Dr. J. J. Duggan

HAS BEEN appointed head of the Nematology Department of the recently established Agricultural Institute of the Republic of Ireland. This Department is at present located at Glasnevin, Dublin, with a research station dealing with nematology as related to sugar beet at Carlow.

Dr. H. McL. Gordon

OF THE McMaster Animal Health Laboratory, New South Wales, and Official Correspondent in Australia of this Bureau, recently made an extended tour of Western Australia and the Northern Territory, in the course of which he visited Esperance, Albury, Geraldton, Carnarvon, Onslow, Roebourne, Wittenoon, Port Hedland, Broome, Derby, Fitzroy Crossing, Hall's Creek, Wyndham, Katherine, Darwin and Alice Springs. Parasitological discussion with colleagues in both states underlined the increasing importance of problems with both cattle and sheep nematodes as stocking rates increase.

Professor M. B. Lal

WHO OCCUPIES the Chair of Zoology in the University of Lucknow, India, visited the United Kingdom during last summer in order to attend the Tercentenary Celebrations of the Royal Society. Professor Lal's fruitful contributions to the advancement of helminthology range over a very wide field but have been most numerous in the area of trematode taxonomy.

Dr. R. F. Riek

PRINCIPAL RESEARCH OFFICER at the Veterinary Parasitology Laboratory, Yeerongpilly, and a member of the external abstracting panel of *Helminthological Abstracts*, has been awarded the degree of Doctor of Veterinary Science by the University of Queensland. Dr. Riek is well known for his work on gastro-intestinal nematodes of cattle, particularly in relation to anthelmintic therapy.

Mr. D. O. Betz

FORMERLY head of the Golden Nematode Regulatory Laboratory at Hicksville, New York, has now joined the Pesticides Regulation Branch, United States Department of Agriculture, Washington 25, D.C., as nematologist.

Dr. J. R. Christie

WHOSE PUBLICATIONS over three decades constitute a major contribution to the science of nematology, officially retired from his post in the University of Florida at the end of June, 1960. Dr. Christie intends to employ his new-found leisure in the further pursuit of the researches for which he is so well-known.

Professor W. D. Lindquist

PROFESSOR OF MICROBIOLOGY and Public Health in the College of Veterinary Medicine, Michigan

State University, is actively engaged in investigating the collection of paramphistomes from the digestive tract of cattle which he made in Nigeria during his recent visit there as a Fulbright Research Scholar. While he was in Nigeria Professor Lindquist gave assistance in the carrying out of a helminth survey being made in the Southern Cameroons by the Federal Department of Veterinary Research, Vom.

Dr. J. F. Maldonado

PRESIDENT of the Puerto Rico Association of Public Health, has been awarded the Isaac González Martínez prize by the Puerto Rican Bilharzia Association in recognition of his meritorious work in the control of schistosomiasis.

Dr. D. L. Price

PARASITOLOGIST in the U.S. Army Medical Corps attached to the Walter Reed Army Medical Centre, Washington, D.C., is carrying out a three-year assignment with the Institute for Scientific Research in Central Africa which has been subsidized by the U.S. Army. Working from a laboratory base at the ISRCA centre in Liviro, he is particularly concerned with filarial parasites.

Dr. W. H. Taliaferro

WHO RECENTLY retired at the age of 65 from the Chair of Bacteriology and Immunology in the University of Chicago has been awarded the Order of Merit by the government of Chile in recognition of his scientific achievements and of his services to the University of Chile. The award was conferred on 25th April last by the Chilean Ambassador in Washington at the Chilean Embassy in the presence of a large and distinguished gathering. For over 30 years Professor Taliaferro has been engaged in studies ranging over the whole field of immunology but more particularly concerned with the basic mechanisms underlying immune phenomena in metazoan parasites. Much of his work on immunity to helminthic infection was based on *Nippostrongylus muris* infections in rats, but he also carried out extensive investigations on filariasis and schistosomiasis. His book "The Immunology of Parasitic Infections", although written 30 years ago, still remains a classic. A new edition would be most welcome.

Mr. G. O. Unrau

SANITARY ENGINEER has been assigned to the Puerto Rico Field Station, Technology Branch, CDC, to conduct engineering studies in connection with schistosomiasis control and, in particular, to investigate the role of sewage effluent in the maintenance of schistosomiasis infection of vector snails.

Dr. Moses K. Agosin

WELL KNOWN to helminthologists for his work on anaerobic glycolysis in *Trichinella spiralis* and on the metabolism of *Echinococcus granulosus*, has received the title of Professor Extraordinary of Biological Chemistry in the Faculty of Medicine of the University of Chile.

INDEX OF AUTHORS

(The reference is to the serial number, except in the case of book reviews etc. where page numbers are given in italics. Numbers in parentheses indicate subsidiary authors in cases of joint authorship.)

Abstract No.	Abstract No.	Abstract No.
Anon.	Bhatia, B. B.	Chiricutza, I.
1595, 1644, 1717, 1737, 1816, 1817, 1865, 1866, 1867	Bijloo, J. D.	Chowdhury, A. B.
Abdel Malek, E. 1592, 1776, 1779, 1815	Biocca, E.	Chu, P. Y.
Abdel Moneim, F.	Bishaeva, L. K.	Chubb, L. G.
Abdussalam, M.	Bitters, W. P.	Ciccarone, A.
Abe, H.	Bizzell, W. E.	Giordia, H.
Abo, S.	Blake, C. D.	Clark, D. G.
Abou-Gareeb, A. H.	Bloom, J. R.	Clarke, N. A.
Acharya, P. T.	Boev, S. N.	Clarke, O. F.
Agapova, A. I.	Bogomolova, N. A.	Clegg, J. A.
Agarwal, S. M. 1958, 1959, 2088, 2089	Boko F., F.	Cloetens, W.
Ahmed, Z. F.	Bondareva, V. I.	Coil, W. H.
Akesson, W. B.	Bonetti, F.	Coleman, O. H.
Alberti, M.	Boray, J. C.	Collins, R. A.
Aldová-Klecková, E.	Borchert, A.	Coman, D.
Alexander, M. A.	Borski, A. A.	Comyn, P. M.
Alicna, A. D.	Bortolini, G.	Conroy, J. V.
Aliev, A. R.	Boswell, S. B.	Conroy, R. J.
Allain, D. S.	Botero R., D.	Cooper, W. E.
Allen, A. M.	Bouckaert, L.	Corbo, S.
Allen, P. H.	Bouriquet, G.	Cort, W. W.
Allen, R. W.	Bouvier, G.	Cortini, M.
Altmann, G.	Bowery, T. G.	Cosgrove, G. E.
Alwar, V. S.	Boyd, G. R.	Couch, H. B.
Ameel, D. J.	Bozhkov, D.	Couturier, P.
Amin, S. P.	Brázdova, K.	Crisp, D. T.
Anantaraman, M.	Brenes, R. R.	Crites, J. L.
Anantaraman, S.	Briseño, C.	
Anderson, R. C.	Britain	
Andrássy, I.	Brooke, M. M.	Dahlstrom, R. V.
Antipin, D. N.	Brooks, jr., T. J.	Dallimore, C. E.
Arcan, V. M.	Brown, M. L.	Dalling, T.
Armand Ugón, C. V.	Browne, S. G.	D'Ambrosio, R.
Armour, J. (1728), (2183), (2276), 2289	Brücher, H.	Damon, S. R.
Armstrong, M. C.	Bruni, F.	Danaraj, T. J.
Arora, U. S. (1647), (1648), 2221, 2222	Brzeski, M.	Darling, H. M.
Arruda, H. V. de	Bubis, J. J.	Davidson, T. R.
Asadov, S. M.	Buckley, J. J. C.	Davis, R. A.
Asai, M.	Budd, J.	Davis, R. A.
Askerkhanov, R. P.	Budden, F. H.	Dawes, B.
Astrozhnikov, Y. V.	Bueding, E.	Dawes, T.
Azami, S.	Burgisser, H.	Dean, B. H.
	Burov, G. A.	Dean, J. L.
		Debelmas, A. M.
Babjankas, N. A.		DeGiusti, D. L.
Babkin, L. T.	Caballero y C., E.	De Jongh, R. T.
Bailey, W. S.	Cairns, E. J.	Delard, G.
Baines, R. C.	Caldas, A. D.	De Mey, D.
Baker, N. F.	Calderon, E.	D'Ercole, G.
Balabekyan, T. P.	Calo, A.	Derweiler, D. K.
Bambridge, B.	Campbell, A.	DeWolfe, T. A.
Bandyopadhyay, A. K. (1647), (1648)	Campo Jesus, L. del	D'Herde, J.
Banks, A. W.	Cancio, M.	Diaz Díaz, E.
Barke, A.	Carballeira, D.	Diaz Muñoz, A.
Barry, M. R.	Cardell, jr., R. R.	Diaz-Rivera, R. S.
Basnuevo, J. G.	Carithers, R. W.	
Basu, S. P.	Carneri, I. de	Dick, J. B.
Baxter, L. W.	Carré, J.	Dittmann, A.
Bayanov, M. G.	Carta, G.	Djafar, M. I.
Beadle, L. C.	Carter, C. R.	Dobbin, jr., J. E.
Becker, R. B.	Catalano, G.	Dollfus, R. P.
Bélangier, L. F.	Cavalli, V.	Dolliver, J. S.
Bello, R. di	Caveness, F. E.	Dolnikov, Y. Y.
Bennetts, H. E.	Cavier, R.	Donkersloot, T. A.
Bennington, E.	Cerqueira Falcão, E. de	Dorsman, W.
Berdonneau, R.	Chabaud, A. G.	Douglas, J. R.
Berezantsev, Y. A.	Chambers, S. C.	Douglas, L. T.
Berg, G.	Chandler, E. K.	Douvres, F. W.
Bergman, B. H. H.	Chang, C. H.	Drake, C. G.
Berry, E. H. J.	Chang, S. L.	Drudge, J. H.
Bhaduri, N. V.	Chapman, R. A.	Duce, A.
1647, 1648, (2158), (2221), (2222)	Chauhan, B. S.	Dunagan, T. T.
Bhargava, R. K.	Cheng, T. C.	Duron, J.
(1711)	Chengé, P.	Dusanic, D. G.
		Duuren, A. J. van

	Abstract No.		Abstract No.		Abstract No.
East Africa	373	Gupta, S. P.	1996	Kabler, P. W.	(1703)
Eisen, J.	(1669)	Güralp, N.	2296	Kagan, I. G.	2268
Elam, G. W.	(2242)	Guttowa, A.	2122	Kantzes, J. G.	1939
Elmer, O. H.	1883	Guy, E.	(1613)	Karabaev, D. K.	1744
Engel, A. E.	1740			Kasimov, G. B.	1811
England & Wales	373	Haglund, W. A.	1933	Katamine, D.	2176
Era, E.	2164 (2176)	Hahn, A. W.	2045	Katch, A. K.	(2181)
Ergens, R.	1957	Hakushika, M.	(2298)	Kates, K. C.	1745
Ershov, V. S.	2261	Hall, J. E.	1967, 1968	Katiyar, R. D.	1746
Erwin, D. C.	(1919)	Hamilton, P. K.	2233	Kawamura, T.	2177
Esser, R. P.	1990	Hansbrough, T.	1934	Keith, R. K.	(2201), (2303)
Euzéby, J. A.	2165	Harinasuta, C.	1602	Kelley, G. W.	1747, (2307)
Everard, C. O. R.	2166	Harper, K.	2046	Kemper, A.	1892, 1893, 1956
		Harris, L.	(1747)	Kershaw, W.	2324
Fadell, E. J.	(2036)	Harrison, M. B.	1935	Kessel, J. F.	(1670)
Fain, A.	1627, (1702)	Hart, J. A.	(2289)	Keulen, A. van	1725, 2315
Familaro, J. E.	(1669)	Hartwell, W. V.	2170	Khan, S. A.	2236
Farrin, A. E.	(2206)	Haskins, W. T.	(2031), (2032)	Khera, S.	1970, 1997
Faust, E. C.	1657	Head, E. E.	(2049)	Kidney, J. G.	(1678)
Favard, P.	2083	Heide, D.	(1754)	Kimata, H.	(2248)
Feder, W. A.	(2166)	Hernández Vallados, R.	1661, 2297	Kim Jyong Hi	1830
Fenger, J. R.	1658	Heyneman, D.	1791, 2123, 1936	Kimura, S.	(2274)
Fenwick, D. W.	1884	Heyns, J.	1936	King, T. H.	(1933)
Ferretti, G.	2092	Hidalgo Escalante, E.	2019	Kirisawa, T.	(2246)
Fielding, M. J.	1885, (1929)	Hill, D. H.	1767	Kirkpatrick, J. D.	2178, 2179
Fiennes, R. N. T. W.	1825	Hillemand, P.	1631	Kloetzl, J.	(1584)
Finley, E. L.	(2235)	Hiranaka, K.	(2052)	Kloetzl, K.	1584
Finocchiaro, S.	1628	Hirano, K.	(2177)	Kloss, G. R.	1998, (2012)
Fisher, E. G.	(2178), (2179)	Hirschmann, H.	(2145)	Klotz, L. J.	2047
Flückiger, G.	2326	Hoepli, R.	370	Knierim, F.	2269
Foot, F. J.	(1912)	Hörning, B.	(2330)	Kobayashi, M.	2237, 2238
Forstner, M. J.	1991, 2167	Hoffman, G. L.	1863	Kojima, K.	(2028)
Foster, A. O.	(1748)	Hofstra, K.	1724	Kojima, T.	2180
Fotadar, D. N.	1965	Hollis, J. P.	(1934), 2094	Kolobolozki, G. W.	(1841)
Fraga de Azevedo, J.	2027	Holmes, J. C.	2171, 2172	Komine, S.	(2246)
Francis, R. S. R.	(1621)	Hooper, D. J.		Komiya, Y.	2028
Franklin, M. T.	370	Hopper, B. E.	371, 1888	Kondor, L.	(1705)
Freeman, K. C.	(1929)	Hosoya, H.	(2248)	Konno, S.	(2015)
Freitas, J. F. Teixeira de		Hsü, H. F.	(1603), (2262)	Kopirin, A. V.	1831, 2072, 2318
	1992, 1993, 1994, 2093	Hsü, S. Y. Li	1603, 2262	Koppisch, E.	(1600)
French, N.	1931	Hubben, K.	(1782)	Kormienko-Koneva, Z. P.	1778
Friedheim, E. A. H.	1659	Hughes, M. B.	1937	Korthals, A.	2073
Fu, H. C.	(1699)	Hunter, III, G. W.	(2217)	Koryazhnyov, V. P.	1769
Fujisaki, T.	2018	Hussey, K. L.	(2026)	Koski, J. T.	1894
Fülöp, T.	1705	Hutchinson, M. T.	1889	Kotelnikov, G. A.	1976
Furmaga, S.	2294	Hutchison, H. S.	(2233)	Kotlán, A.	2074
Furnell, M. J.	(1678)	Hutchison, W. F.	(1622)	Kovács, F.	1726
		Hutton, R. F.	(1974), (2138)	Kreis, H. A.	1832
Gadzhiev, D. V.	1766			Kruidenier, F. J.	2095, 2181
Gaitán-Nieto, A.	1629	Ibragimov, M.	2124	Kuba, N.	(2274)
Galuzo, I. G.	1826	Ichihara, T.	(2283)	Kulkarni, D. R.	(1686)
Gambino, J. J.	2321	Ichii, S.	2173	Kulkarni, V. B.	(1708)
Garber, M. J.	(1919)	Iida, M.	2263, 2264	Kume, S.	(2053)
Garcia-Palmieri, M. R.		Ikeshoji, T.	2029	Kunii, Y.	2125, 2126, 2182
	(1599), (1600), (1601)	Ikeuchi, M.	(2302)	Kuntz, R. E.	1585, (1963)
Geidarov	1741	Ilin, M. M.	(2169)	Kuramoto, T.	(2283)
Gemmell, M. A.	1805	Imamura, H.	(2192)	Kurtpinar, H.	1833
Gerasimova, G. N.	1783, (1801)	India	374	Kuttler, K. L.	2239
Gerlach, S. A.	1995	Ishak, E. S.	(1610)		
Gevedze	1723	Ishak, K. G.	2234	Lagraulet, J.	(1698)
Gibbs, H. C.	1742	Ishihara, K.	1784	Laigret, J.	(1670)
Gibson, P. B.	(1870)	Ishihara, T.	1829	Lamina, J.	(2305)
Gibson, T. E.	1743, 1827, 2295	Itagaki, S.	(1829)	Lancaster, W. E.	1834
Gibson, T. G. E.	1828	Ito, J.	1785, 1786	Langeler, J. E. T.	1727
Gilmore, R. E.	1806	Ito, R.	2298	Lanier, T. J.	1895
Ginetsinskaya, T. A.	2322	Ito, Y.	(2302)	Larizza, P.	2240
Ginsberg, A.	2044, 2327	Ivashkin, V. M.	1807	La Rosa, F.	(1638)
Gnedina, M. P.	2119	Izaak, A. P.	1604	Larrieu	1664
Gnezdirov, V. G.	2120			Larsh, jr., J. E.	2270
Golden, A. M.	1886, 2168	Jacobsen, A.	1890	Lataste, J.	(1631)
Golikova, M. N.	2121	Jamison, P. W.	(2233)	Lautenschlager, E. W.	2096
Golishkina, K. K.	2169	Jarrett, W. F. H.	2265, 2266	Lear, B.	1940
Golvan, Y. J.	2323	Jenkins, L.	1938	Lee, D. L.	2097
Gómez-Moreno, C.	(1701)	Jenkins, W. R.	(1900), (1939), (2202)	Lee, R. P.	1728, 2183, (2276)
González, O.	(1601)	Jennings, J. B.	2174	LeGolvan, P. C.	(2234)
González Barranco, D.	(2052)	Jiménez-Quirós, O.	1969	Lehmann, D. L.	1814
González de Vega, N.	1701	Jirovec, O.	2329	Leland, jr., S. E.	2241, 2242
González Gallardo, B.	(1768)	John, B.	2084, 2085	Leukel, R. W.	1896
Good, J. M.	1932	Johns, D. M.	(1926), (1953)	Lewert, R. M.	(2207)
Goodey, J. B.	370	Johnson, R. T.	1891	Lewis, D. G.	2048
Goulson, H. T.	(2270)	Johri, G. N.	1975	Lewis, F. J. von M.	2184
Gracia Rodrigo, A.	1980	Jonathan, O. M.	1632	Lewis, J. M.	(1941)
Grainger, J.	1887	Jones, F. G. W.	2175	Lewis, S.	1897
Grassi, G.	1630	Jones, jr., H. L.	(2233)	Li, S. L.	1666
Greenberg, A. E.	2328	Jones, J. E.	2235	Li, W. C.	1665
Greenstein, N. M.	1660	Jordan, P.	1662, 1663	Lichtenstein, E. P.	(1931)
Grigorev, N. K.	2231, 2232	Jordano Barea, D.	1768	Lienert, E.	1792
Guengerich, H. W.	(1938)	Jung, R. C.	2267	Lillo, F. de	1633
Gulati, J.	(2309)	Jungmann, R.	(2314)	Lin, S. S.	(2277), (2278)
Gupta, P. D.	1966			Linford, M. B.	(2157)

	Abstract No.		Abstract No.		Abstract No.
Lippi, M.	1676	Nardi, E.	1787	Poggi, I.	1688
Little, M. D.	(2046)	Nash, J.	1678	Poirier, A.	1608
Liu, C. S.	1605	Nasitowska, M.	(1809), (2313)	Polanco, G.	(2245)
Liu, E. H.	(1699)	Natarajan, R.	(1735)	Poljakow, A. A.	1841
Lloyd, E. L.	1634	Nath, K.	(1674), (1706)	[Poluszynski, G.]	2320
Loewenberg, J. R.	2185, 2243	Neal, A. L.	(2170), 2195	Popow, J.	2251
Logachev, E. D.	2098	Neghme R., A.	1857	Prakash, S.	(1674)
Lombardo, G.	(1628)	Nebolsina, T. K.	1707	Pramer, D.	2197
Londoño S., J.	(1682)	Neghme R., A.	1941	Pratt, I.	(2116)
Lo Nigro, M.	1668	Nettles, W. C.	(1953), (2235)	Prémont, M.	(1631)
Lownsbey, B. F.	1898, 2049, 2186	Newsom, L. D.	374	Prescott, D. M.	2198
Lubinsky, G.	2127	New Zealand	1942	Prestage, J. J.	2103
Luc, M.	1999, 2000, 2001	Nigh, jr., E. L.	1679	Price, D. L.	2005
Lucker, J. T.	1748, 2187	Nimane, G.	(2192)	Price, J. L.	(2146)
Lucky, Z.	(1957)	Nishimura, T.	2131	Pritchard, M. H.	(1971)
Luigi, L.	1835	Noda, K.	2246	Provenza, D. V.	(1962)
Lukin, E. I.	2075	Noguchi, I.	(1785), (1786)	Pullin, J. W.	(1742)
		Noguchi, M.	(2234)		
McCarthy, D. D.	1587, 1672, 1673	Noorman, Z.	(2268)	Quattrocchi, G.	1638, 2252
McCauley, J. E.	1860	Norman, L.	(2268)	Queiroz, J. C. de	1773, (1781), (2301)
Machado de Mendonça, J.	(1993), (1994)	Northern Rhodesia	374		
		Nugara, D.	(1798)		
Machida, K.	(2218)				
Mackiewicz, J. S.	1856	Oates, J. K.	1680	Race, G. J.	(2270)
McKinney, H. E.	(1920)	Odetoyinbo, J. A.	1812	Ramakrishna, G.	(1955)
McKittrick, R. T.	(1899)	Ogino, Y.	1681, 2247	Ramos-Morales, F.	(1599), (1600), (1601)
Mackawa, T.	(1785)	Ogren, R. E.	2123		
Magath, T. B.	2128, 2271	Oguni, H.	2248	Ranatunga, P.	1733
Maharaj, S. B.	(1884)	Oishi, I.	2053	Rankin, H. W.	1904
Mahieux, A.	(1654)	Okabe, K.	2272	Rao, K. H.	1978
Mai, W. F.	(1882), (2178), (2179), (2184), 2244	Okoshi, S.	1837, 1838	Rao, V. K.	(1640)
Makrushin, P. V.	(1753)	Okuno, K.	2273	Raschke, K.	(1946)
Malo, S.	2050	Olivier, L.	2031, 2032	Rausch, R.	2104
Mann, K. H.	2076	Olsen, L. S.	(1747), (2307)	Ray, H. N.	(2158), (2194)
Mann, L. S.	1669	O'Mera, P. B.	(1678)	Read, C. P.	(2057), 2199
Manoliu Furnica, C.	(1624)	Onabamiro, S. D.	(1767)	Rechnitzer, P. A.	1639
Manter, H. W.	1971	Ono, Y.	1839, 2274	Reddy, D. J.	1640
Marble, D. W.	(2239)	Orduña Prieto, C.	1588	Reed, J. P.	(1889)
March, H. N.	1670	Orehkov, M. D.	(1778)	Reid, W. M.	1798, 2200
Marchand, E. J.	(1599), 2245	Orlov, N. P.	(1821)	Respalidza Cardenosa, E.	1774
Marcial-Rojas, R. A.	(2245)	Orrego M., A.	1682	Rhoades, H. L.	2157
Marganska, M.	(1591)	Osada, Y.	(2029)	Ricci, M.	(1704)
Markevich, A. P.	2319	Osborne, H. G.	1751	Rico, C. M.	1813
Marlatt, R. B.	1899	Osborne, W. W.	1943	Riek, R. F.	2201, 2303
Marzullo, F.	1586, 1606, 1836, 2051, 2188, 2189, 2190	Oshio, Y.	2302	Riggs, R. D.	(1923)
		Osimani, J. J.	1683	Riley, J. A.	(1944)
		Osipov, A. N.	(2119)	Rimini, R.	(1619)
		Ozeretskoykaya, N. N.	2249	Rishbeth, J.	1905
Mathur, R. N.	2020			Robinson, R. A.	1906
Matsumoto, K.	(2173)	Pacheco, G.	(2267)	Roca Estevev, A.	(1619)
Maung, M. O.	1900	Pacheco Sanchez, S.	1684	Roche, M.	2253
Mavor, H.	1671	Paden, W. R.	1944	Rodriguez, R.	(2245)
Mayhew, R. L.	1729	Padgett, W. H.	(1888)	Rodriguez Aguilar, M.	(1701)
Mazzotti, L.	2052, 2299	Pali, E. T.	1685	Rodriguez-Molina, R.	1609, (2259)
Medeiros, L. do C. M. de	(2027)	Panchenko	1731	Roediger, K. J.	1948
Mehra, P. N.	2300	Pande, B. P.	(1780)	Rohde, R. A.	2202
Mello, D.	(1773), (1781), 2301	Pandeya, S. N.	(1706)	Rohrbacher, jr., G. H.	2203
Merdivenci, A.	1749, 1796	Parekh, J. G.	1686, 1708	Roman, E.	2275
Merkushev, A. V.	1779	Parikh, C. C.	1687	Romanova, G. P.	1858
Metrick, D. F.	2002, 2099	Parker, K. G.	(2178), (2179)	Ronald, K.	1861, 1862
Meyer, F. P.	1977	Paskalskaya, M. Y.	1752	Ronzhina, G. I.	1753
Meyling, A. H.	2030	Patel, B.	(1708)	Rose, J. H.	2135
Mikhnyuk, S. P.	1771	Patel, J.	(1631)	Rosner, D.	(1624)
Mironov, V. I.	(1755)	Patterson, D. F.	(1782)	Ross, J. G.	(1728), (2183), 2276
Misra, S. S.	1674	Patton, J. W.	1901	Ross, T. G.	(1622)
Mitchell, J. T.	(2049)	Patz, I. M.	2250	Rostombekova, N. V.	1710
Mitrokhin, V. U.	2191	Pavlov, P. I.	1797	Rothman, A. H.	(2057), 2105, (2199), 2204
Mittal, T. C.	(2300)	Pearson, J. C.	1902		
Mitton, R. L.	(2291)	Pender, M. T.	2078, 2133	Rothstein, N.	2054
Miyamoto, Y.	(2248)	Pérez-Giménez, M. E.	(2253)	Ruiz Reyes, F.	(1684)
Miyazaki, I.	2100	Perris, C.	1635	Rump, L.	1907
Miyazawa, M.	2101	Perry, V. G.	2003, (2255)	Russel, D. A.	(1926), (1953)
Mochizuki, H.	(1785), (1786)	Perumal Pillai, C.	1840		
Moreira, E.	1675	Pessoa, S. B.	371	Sabour, M.	(2234)
Morishita, K.	1676, 2192	Peters, B. G.	1945	Sadikhov, I. A.	(2004), 2006
Morton, D. J.	(1899)	Petrochenko, V. I.	2134	Sadun, E. H.	2277, 2278
Mountain, W. B.	(2055)	Petrov, A. M.	2004	Safley, T. J.	(1622)
Mozgovoi, A. A.	1730	Petukhov, M. I.	1636	Saint Girones, M. C.	(1804)
Mueller, J. F.	2129, 2130, 2193	Phifer, K.	2196	Saito, K.	1842
Mukherjee, A. K.	(2222)	Pieroh, E. A.	1946	Sakai, T.	(1784)
Mukherjee, K. L.	(1640)	Piroux, A.	(1627)	Sala, A. R. de	(2259)
Muniswamy, M.	(1786)	Pistey, W. R.	2021	Salentiny, T.	1908
Murakami, M.	1750	Pitchford, R. J.	1607, (2030)	Salib, M.	(2234)
Musienko, I.	2077, 2102	Piyanzov, M. S.	1732	Sameshima, H.	1689
Myers, B. J.		Plummer, J. C.	1947	Santos Dubra, A.	1641
		Poblete, L. S.	1709	Sarwar, M. M.	2079
Nagase, N.	1677	Podyapolskaya, V. P.	1637	Sasa, M.	1690, (2029)
Nair, V. K.	(2254)	Poffe, F.	(1679)	Sasser, J. N.	(1927), (2110)
Nakajima, T.	1772			Sato, T.	(1689), 2304

Abstract		Abstract		Abstract	
No.		No.		No.	
Savary, A.	1909	Standifer, M. S.	2255	Uhlenbrock, J. H.	1950
Sawada, I.	1799, 2136	Stanković, S.	1864	Ulmer, M. J.	(1812), (1977)
Sayed, B. A.	(2035)	Steck, W.	2058	Uminski, J.	(1591)
Sayegh, E. S.	1610	Steele, A. E.	(1932)		
Sayre, R. M.	2055	Stefanski, W.	2331	Vairasthira, S.	(1602)
Schacher, J. F.	(2260)	Stegawski, T.	1696	Vasileva, I. N.	2034
Schad, G. A.	2007	Steinberg, D.	(1660)	Ventura, S.	(2240)
Schiller, E. L.	2056, 2057, 2106	Stettler, H.	(2058)	Venturino, W.	(1620)
Schindler, A. F.	1910	Stewart, D. F.	2282	Vergun, G. I.	(2137)
Schmidt-Hoensdorf, F.	2330	Stewart, R. N.	(1910)	Vicenzo, M.	(1835)
Schneider, P. A.	(1822)	Stirewalt, M. A.	2140, 2208	Viglierchio, D. R.	2067, (2186)
Schoop, G.	2305	Stoll, N. R.	(2197)	Vigneron, A.	1613
Schott, G.	1843	Suganuma, Y.	(1784)	Vikhert, A. M.	(2249)
Schreier, O.	1911	Sugiura, K.	(2173), (2246)	Visser, T.	1951
Schuler, G.	(2063)	Suguro, T.	2059	Vita, L. A.	(1813)
Schulz, J. A.	1754	Sullivan, T.	(2185), (2243)	Vittoz, R.	1849, 2332
Schulz, R.	2279	Sundaram, R. H.	1735	Voge, M.	2111, (2198), 2212
Schuster, M. L.	(2185), (2243)	Susumi, S.	2283	Voitenko, D. D.	1762
Schutte, C. H. J.	(2030)	Sutherland, W.	(1639)	Von Brand, T.	2213, 2214
Scotland	374	Swanson, L. E.	1736, (2230)	Vora, D. D.	2215
Scott, D.	1691			Vythilingam, M. K.	(1951)
Selivanova, A. S.	1800				
Selivanova-Yartseva, A. S.	1801, 2022, 2306	Takahashi, O.	2284, 2285	Wagner, A.	2112, 2216
Seliverstov, P. A.	(1753)	T'an, C.	1611	Walker, J.	(1872)
Sella, A.	1714	Tanabe, N.	2286	Walker, J. T.	2068
Semago, M. I.	1692	Tanaka, T.	(2272)	Walton, B. C.	(2278)
Semeniuk, P.	(1910)	Tandon, R. S.	2141	Ward, C. H.	2069
Semenov, V. S.	1642	Tani, T.	(1676)	Ward, J. W.	1808
Sen, H. G.	2307	Taparelli, F.		Warren, L. E.	1952
Seneviratna, P.	2308	(1586), (1589), (1606), (1695),		Watanabe, K.	(1785), (1786)
Serres, J. R.	1844	(1836), (2051), (2188), (2189),		Watanabe, S.	1850
Shafer, T.	(2168)	(2190)		Watson, N. H. F.	2146
Shanker, A.	(1674), 1711, 2309	Tarjan, A. C.	2060, 2061	Weiner, D.	1590
Sharaf, A.	2310	Taub, M.	1643	Weinman, C. J.	2217
Shenman, G.	(2073)	Taylor, A.	2209	Weiser, J.	2147
Sher, S. A.	1912	Taylor, D. P.	1917, 1918	Wells, J. C.	(1927)
Shevchenko, N. N.	2137	Tchoubabrie, I. T.	2311	Werres, H.	(1946)
Shevchenko, R. V.	(1795)	Tetley, J. H.	1758, 1759, 1760, 1761	Wharton, R. H.	2023, 2024
Shikhobalova	2205	Teuscher, E.	2062, 2063	Wheatley, G. W.	(1891)
Shinkado, O.	1693	Thannisch, G.	1697	White, J. B.	1851
Shmakov, V. T.	1755	Thiele, H. G.	1612	Whitehead, A. G.	2013, 2014
Shoho, C.	(1840), 1845, 1846, 2080, 2254	Thomason, I. J.	1919, 1920, 1949, 2210	Whitlock, J. H.	(2209)
Shookhoff, H. B.	1712	Thompson, jr., J. H.	(2128)	Whitlock, L. S.	(1929), (2094)
Shrivastava, B. N.	(1711)	Thorne, G.	(1931), (2003)	Wilcox, G. E.	1953
Shrivastava, P. S.	1972, 1973	Timm, R. W.	2009, 2010, 2011	Wilcox, H. S.	1788
Shults, R. S.	1847	Timms, A. R.	2211	Williams, J. B.	2113, 2148
Shumakovich, E. E.	1756	Timon-David, J.	2142, 2143	Wilson, J. D.	(2068)
Silva, R. da	1694	Tiner, J. D.	2064, 2065	Winstead, N. N.	1923
Simmonds, F. J.	375	Tinnila, A.	1921	Witkow, A.	(1590)
Simmons, J. E.	(2199)	Tipton, R. R.	(1650)	Wolcott, G. B.	2087
Sindermann, C. J.	2206	Tokin, I. B.	2086	Wootton, D. M.	2149
Singh, K. S.	2207	Tölgyesi, G.	2033	Wu, C. L.	1699
s'Jacob, J. J.	2008	Tomimura, T.	2107, 2108, 2109, 2144	Wu, L. Y.	2114
Skryabin, K. I.	371	Toro, A. S.	1713	Wyant, Z. N.	(2241), (2242)
Smart, jr., G. C.	1913	Torregrosa, M. V.	(1600)	Wyllie, T. D.	(1918)
Smith, A. L.	1914, 2316	Torroella, J.	1698	Wysocka, F.	1591
Smith, F. H.	(1941)	Torzecki, Z.	2256	Wysocki, E.	1809, 2313
Sobolev, A. S.	1734	Toshchev, A. P.	(1789)		
Sofiev, B. I.	1848	Tos-Luty, S.	(1591)	Yamakawa, S.	2288
Sogandares-Bernal, F.	1974, 2138	Touratier, L.	2312	Yamashita, J.	2015
Solomentsev, D.	(1654)	Townshend, J. L.	1922	Yamov, V. Z.	1763
Somasekhar, P.	1915	Travassos, L.	2012	Yanchev, Y.	2150
Sood, S. M.	1757, (1780)	Trawinski, A.	2287	Yasin, S. A.	1852
Soulsby, E. J. L.	2280, 2281	Tretyakova, O. N.	1715	Yazima, F.	2218
Spaski, A. A.	1979	Triantaphyllou, A. C.	2110, 2145	Yokogawa, M.	1793, 2151
Sprau, F.	1916	Tribin-Piedithita, A.	(1629)	Young, V. H.	1954
Sprent, J. F. A.	2139	Trizon, F.	2066	Yudin, A. M.	1775
Squadri, F.		Tsunoda, H.	(2298)		
(1586), 1589, (1606), 1695, (1836),		Tsurusaki, T.	(2298)	Zanzibar Protectorate	375
(2051), (2188), (2189), (2190)		Turligina, E. S.	2257	Zhidkov, A. E.	1802
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